OPERATING MANUAL

2026
DEFOLIATOR

Amity TECHNOLOGY

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MANUAL PART NO: 306436

RELEASE DATE: 3/2026
DESIGNED AND MANUFACTURED IN USA

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AMITY TECHNOLOGY LLC LIMITED WARRANTY TERMS AND CONDITIONS – UNITED STATES

EFFECTIVE FOR EQUIPMENT RETAILED AND DELIVERED AFTER JUNE 1, 2020

WHAT IS WARRANTED Amity Technology warrants its new equipment to be free of defects in material and workmanship at time of delivery to the first retail purchaser, renter, or lessee. Amity Technology warrants any new or unused part which is manufactured by Amity Technology for use in an Amity Technology machine, jointly referred to as "Products", whether such Product is purchased through an authorized Amity Technology dealer or directly from Amity Technology. Under this Warranty, Amity Technology will repair or replace, as it chooses in its sole discretion, any covered Product, or any component thereof, which Amity determines to be defective. These terms apply to all Amity Technology brands of new equipment originally marketed in the United States.

WARRANTY PERIOD

- 12 Months from the date of delivery to the first retail purchaser, renter or lessee.

EXCEPTIONS FROM THIS WARRANTY

- Freight Charges - This warranty does not cover freight charges.
- Improvements, Changes, or Discontinuance Amity Technology reserves the right to make changes and improvements in design or changes in specifications at any time to any product without incurring any obligations to owners of products previously sold.
- Repairs and Maintenance Not Covered Under Warranty - This warranty does not cover conditions resulting from misuse, natural calamities, use of non-Amity Technology parts, negligence, alteration, accident, use of unapproved attachments, usage which is contrary to the intended purposes, or conditions caused by failure to perform required maintenance. Replacement of Wear or Maintenance items (unless defective) such as but not limited to, filters, hoses, belts, lubricants, light bulbs, wheel alignment, tightening of nuts, belts, bolts, and fittings, service tune-up, computer parameter adjustments and general adjustments which may from time to time be required are not covered.
- Rubber Tire Warranty - Rubber tires are warranted directly by the respective manufacturer only and not by Amity Technology.

OWNER'S OBLIGATION

It is the responsibility of the Owner to transport the equipment or parts to the service shop of an authorized Amity Technology Dealer or alternatively to reimburse the Dealer for any travel or transportation expense involved in fulfilling this warranty. This Warranty does NOT cover rental of replacement equipment during the repair period, damage to products which have been declared a total loss and subsequently salvaged, overtime labor charges, freight charges for replacement parts, or special handling requirements (such as, but not limited to, the use of cranes).

EXCLUSIVE EFFECT OF WARRANTY AND LIMITATION OF LIABILITY

THIS WARRANTY IS IN LIEU OF ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PURPOSE OR OTHER REPRESENTATIONS, WARRANTIES OR CONDITIONS, EXPRESSED OR IMPLIED. The remedies of the Owner set forth herein are exclusive. The Company neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the sale of covered machines. Correction of defects, in the manner and for applicable period of time provided above, shall constitute fulfillment of all responsibilities of Amity Technology to the Owner, and Amity Technology shall not be liable for negligence under contract or in any manner with respect to such machines. IN NO EVENT SHALL THE OWNER BE ENTITLED TO RECOVER FOR INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES SUCH AS BUT NOT LIMITED TO, LOSS OF CROPS, LOSS OF PROFITS OR REVENUE, OTHER COMMERCIAL LOSSES, INCONVENIENCE OR COST OF RENTAL OR REPLACEMENT EQUIPMENT.

Some States or Provinces do not permit limitations or exclusions of implied warranties or incidental or consequential damages, so the limitations or exclusions in this warranty may not apply.

Additional Warranty Information

New Equipment Warranty - Equipment is eligible for warranty service only if it qualifies under the provisions of the New Equipment Warranty. The selling dealer will deliver this Warranty to the original retail purchaser at the time of sale, and the dealer will register the sale and Warranty with Amity Technology LLC.

Subsequent Owners - This Warranty covers the first retail purchaser and all subsequent owners of the equipment during the specified warranty period. Should the Amity Technology Dealer sell this equipment to a subsequent owner, the Dealer must deliver the warranty document to the subsequent owner so the subsequent owner can register ownership with Amity Technology and obtain the remaining warranty benefits, if available, with no intermission in the Warranty Period. Subsequent Owner Procedure will apply. It is the responsibility of the subsequent owner to transport the equipment to the service shop of an authorized Amity Technology Dealer or alternatively to reimburse the Dealer for any travel or transportation expense involved in fulfilling this warranty. This Warranty does NOT cover charges for rental or replacement equipment during the repair period, products which have been declared a total loss and subsequently salvaged, overtime labor charges, freight charges for replacement parts, or units sold at auction.

Warranty Service - To be covered by Warranty, service must be performed by an authorized Amity Technology Dealer. It is recommended that you obtain warranty service from the Dealer who sold you the equipment because of that Dealer's continued interest in you as a valued customer. In the event this is not possible, warranty service may be performed by any other authorized Amity Technology Dealers in the United States or Canada. It is the responsibility of the Owner to transport the equipment to the service shop of an authorized Amity Technology Dealer or alternatively to reimburse the Dealer for any travel or transportation expense involved in fulfilling this warranty.

Maintenance Service - The Owner's Manual furnished to you with the equipment at the time of delivery contains important maintenance and service information. You must read the manual carefully and follow all the maintenance and service recommendations. Doing so will result in greater satisfaction with your equipment and help avoid service and warranty problems. Please remember that failures due to improper maintenance of your equipment are not covered by warranty.

Maintenance Inspections - To insure the continued best performance from your agricultural equipment, we recommend that you arrange to make your equipment available to your selling Dealer for a maintenance inspection 30 days prior to warranty expiration.

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1.0 INTRODUCTION

1.1 General Information

Read this manual carefully to learn how to operate and service your machine correctly. Failure to read this manual can result in personal injury or equipment damage.

This manual is a permanent part of your machine and should remain with the machine when you sell it.

Measurements in this manual are given in both customary U.S. units and metric equivalents. Use only correct replacement parts and fasteners. Metric and inch fasteners require appropriate tools to install.

NOTE: Right- and left-hand sides are determined by facing in the direction the implement will travel when moving forward.

1.2 Serial Number

Record the serial number, model number, and model year of your machine to help trace the machine in the event that it is stolen. Your dealer also needs these numbers for all warranty claims and for when you order parts.

The machine serial number is found on the serial number plate, which is located on the front of the machine to the left of the hitch.

Record your serial number, model number, and model year in the space provided below.

Serial Number:

_____

Model Number:

_____

Model Year:

_____

2.0 SAFETY

2.1 Recognizing Safety Information in Manual

Figure 2-1 is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.

Figure 2-1: Safety-Alert Symbol

2.2 General Safety

You are responsible for the safe operation and maintenance of your Amity implement. You and anyone else who will operate, maintain, or work around the machine should be familiar with the operating and maintenance procedures and safety information in this manual.

Safety practices protect you and the people around you, so make them a working part of your safety program.

Equipment owners must give operating instructions annually to operators or employees before allowing them to operate the machine, per OSHA regulation 1928.57.

The most important element of safety for this equipment is a safe operator. It is the operator's responsibility to read and follow all safety and operating instructions in the manual. All accidents can be avoided.

A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to serious injury or death.

Do not modify the equipment in any way. Unauthorized modification may impair the function or safety, or both, and could alter the life and warranty of the product.

The following list is a set of safety guidelines to adhere to:

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, or adjusting the machine.

2. Install and properly secure all shields and guards before operating.

3. Have a first-aid kit available and know how to use it.

4. Have a fire extinguisher available and know how to use it.

5. Clear the area of people and remove foreign objects from the machine before starting and operating.

6. Shift to park, disengage PTO, lower machine to ground, relieve hydraulic pressure, stop engine, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing, or disconnecting.

7. Annually review safety guidelines with all operators.
8. Wear suitable ear protection for prolonged exposure to excessive noise.

Think SAFETY! Work SAFELY!

2.3 Maintenance and Operating Safety

1. Read and understand all information contained in the Operator's Manual regarding maintenance, adjustment, and operation of the machine.

2. Shift to park, disengage PTO, lower machine to ground, relieve hydraulic pressure, stop engine, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing, or disconnecting the machine.

3. Keep hands, feet, clothing, and hair away from all moving and/or rotating parts.

4. Ensure that all tractor controls are in neutral before starting.

5. Never wear ill-fitting, baggy, or frayed clothing when working on or around the machine.

6. Make sure that all guards and shields are properly installed and secured before operating the machine.

7. Clear the area of all bystanders, especially children, when carrying out any maintenance or making adjustments on the systems or components.

8. Place stands or blocks under the frame before working beneath the machine.

9. Do not allow riders on the implement or tractor during field operation or transport.

10. Never operate the machine inside a closed building.

11. Stay away from overhead obstructions and power lines during setup and operation. Electrocution can occur without direct contact.

2.4 Hydraulic Safety

1. Always place all tractor hydraulic controls in neutral before dismounting.

2. Make sure that all components in the hydraulic system are kept in good condition and are clean and tight.

3. Replace any worn, cut, abraded, flattened or crimped hoses and metal lines.

4. Do not attempt any makeshift repairs to the hydraulic lines, fittings, or hoses by using tape, clamps, or cements. The hydraulic system operates under extremely high pressure. Such repairs may fail suddenly, creating a hazardous and unsafe condition.

5. Wear proper hand and eye protection when searching for a high-pressure hydraulic leak. Use a piece of wood or cardboard as a backstop instead of hands to isolate and identify a leak.

6. If injured by a concentrated high pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin's surface.

7. Before applying pressure to the system, make sure all components are tight and that lines, hoses, and couplings are not damaged.

8. On self-contained hydraulic systems, make sure that shut off valves are in open position before engaging PTO.

2.5 Transport Safety

1. Read and understand all information in the Operator's Manual regarding procedures and safety when operating the machine in the field or on the road.

2. Make sure the Slow Moving Vehicle (SMV) emblem and required lights and reflectors are in place, clean, and can be seen clearly by all overtaking and oncoming traffic.

3. Do not allow riders on any part of the machine during either field operation or travel.

4. Attach the machine to the tractor using only a drawbar pin with provisions for a mechanical retainer.

5. Always attach a safety chain.

6. Always use hazard warning flashers when transporting unless prohibited by law.

7. Always move all parts of the machine to transport position when travelling on a road.

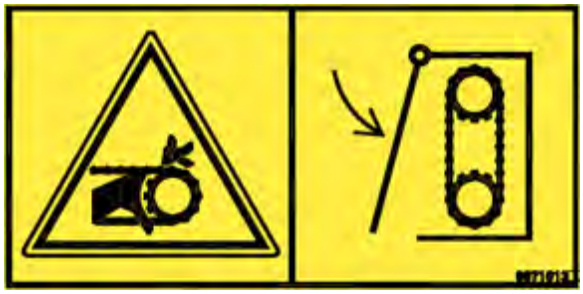
8. Stay away from overhead obstructions, such as power lines.

9. For max transport speed on smooth roads, see section 3.3.

2.6 Safety Decals

The types of decals on the equipment are shown in the illustration below. Proper safety requires that you familiarize yourself with the various safety decals, the type of warning, and the area, or particular function related to that area, that requires your safety awareness.

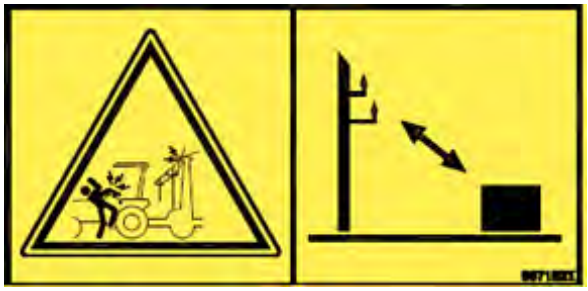
REMEMBER: If safety decals have been damaged or removed, become illegible, or parts are replaced without decals, then new decals must be applied. New decals are available from your authorized dealer.



PN: 9971013

Hazard: Moving Parts

Avoidance: Keep shields and doors in place at all times when operating the machine.



PN: 9971021

Hazard: Electrical Shock

Avoidance: Stay clear of overhead power lines and other obstructions.

PN: 303265

Hazard: Crushing from Above

Avoidance: Never crawl or work under machine unless it is properly supported.

PN: 9971011

Hazard: Moving Parts

Avoidance: Keep hands, feet, hair, and clothing away from moving parts.

PN: 9971015

Hazard: Falling off Machine

Avoidance: Do not climb on the machine.

PN: 997859

Hazard: General Safety Alert

Avoidance: Shut off engine and remove key before performing maintenance or repair work.

PN: 303277

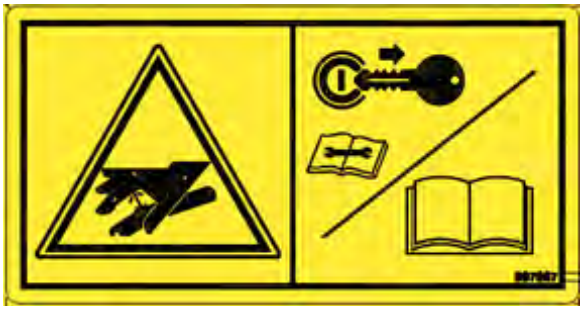
Hazard: Falling off Machine

Avoidance: Do not climb on the machine.

PN: 997861

Hazard: General Safety Alert

Avoidance: Read and understand the Operator's Manual before operating the machine.



PN: 997867

Hazard: High Pressure Fluid

Avoidance: Relieve pressure on system before repairing, adjusting, or disconnecting. Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands. Keep all components in good repair.

PN: 303263

Hazard: Getting Limbs or Clothing Stuck in Machine

Avoidance: Keep hands, feet, hair, and clothing away from moving parts.

PN: 997863

Hazard: Electrical Shock

Avoidance: Keep the machine clear of overhead electrical power lines.

PN: 303268

Hazard: Rotating Part

Avoidance: Keep clothing, yourself, and others clear.

PN: 9971025

Hazard: Crushing from Above

Avoidance: Stay clear of this area while engine and machine are operating.

PN: 311206

Hazard: Whole Body Entanglement

Avoidance: Do not remove safety shield while engine is running.

PN: 307165

Hazard: Flying Debris

Avoidance: Keep top door closed when flails are rotating.

PN: 303267

Hazard: Rotating Flails

Avoidance: Do not approach machine until flail rotation has stopped.

PN: 311207

Hazard: Pinch Point

Avoidance: Keep hands clear of any moving parts around the pinch point.

PN: 997841

Hazard: Crushing from Moving Parts

Avoidance: Stay clear of this area while engine and machine are operating.

PN: 997853

Hazard: Negative Tongue Weight

Avoidance: Stay clear of the tongue when disconnecting the implement from the tractor. Read the Operator's Manual or safety information and operating instructions before operating the machine.

PN: 997857

Hazard: Loss of Machine Control

Avoidance: Install the safety chains when attaching the implement to the tractor. Read the Operator's Manual for safety information and operating instructions before operating the machine.

3.0 SPECIFICATIONS

3.1 Defoliator Specifications

Table 3-1: Defoliator Specifications

Model:	3750	3550	3450	3700	3500	3300	3200
Weight (Approx.)**	15,200 lbs [6,895 kg]	13,200 lbs [5,987 kg]	11,500 lbs [5,216 kg]	13,600 lbs [6,169 kg]	12,000 lbs [5,443 kg]	10,000 lbs [4,536 kg]	9,800 lbs [4,445 kg]
Hitch Weight (Approx.)**	6,050 lbs [2,744 kg]	5,000 lbs [2,268 kg]	4,400 lbs [1,996 kg]	5,000 lbs [2,268 kg]	4,400 lbs [1,996 kg]	3,800 lbs [1,724 kg]	3,700 lbs [1,678 kg]
Recommended Working Speed	3-6 mph [4.8-9.7 kph]	3-6 mph [4.8-9.7 kph]	3-6 mph [4.8-9.7 kph]	2-4 mph [3.2-6.4 kph]	2-4 mph [3.2-6.4 kph]	2-4 mph [3.2-6.4 kph]	2-4 mph [3.2-6.4 kph]
Minimum Recommended PTO RPM	1000 RPM	1000 RPM	1000 RPM	1000 RPM	1000 RPM	1000 RPM	1000 RPM
Maximum Road Travel Speed	24.8 mph [40 kph]	24.8 mph [40 kph]	24.8 mph [40 kph]	24.8 mph [40 kph]	24.8 mph [40 kph]	24.8 mph [40 kph]	24.8 mph [40 kph]
Width	23’11” [7.29 m]	16’0” [4.88 m]	13’4” [4.06 m]	23’11” [7.29 m]	16’0” [4.88 m]	13’4” [4.06 m]	11’0” [3.35 m]
Length (Approx.)**	19’6” [5.94 m]	19’6” [5.94 m]	19’6” [5.94 m]	19’6” [5.94 m]	19’6” [5.94 m]	17’6” [5.33 m]	17’6” [5.33 m]
Height	7’0” [2.13 m]	7’0” [2.13 m]	7’0” [2.13 m]	7’0” [2.13 m]	7’0” [2.13 m]	6’6” [1.98 m]	6’6” [1.98 m]

**Actual weight and length is dependent on options equipped

Installed Options:	11.2-24 tires	With Scalpers
Length:	19’6” [5.94 m]	23’1” [7.01 m]

3.2 Tire Specifications

Table 3-2: Tire Size, Pressure, and Lug Nut Torque

Model:	3750	3550	3450	3700	3500	3300	Bolt Torque
11.2-24 Tires:	36 psi [2.48 bar]	32 psi [2.21 bar]	32 psi [2.21 bar]	28 psi [1.93 bar]	26 psi [1.79 bar]	22 psi [1.52 bar]	125 lb-ft [169 Nm]

3.3 Hydraulic Flow Rates

Each hydraulic circuit for the defoliator has a designated flow rate; approximate values are listed in the table below.

Table 3-3: Hydraulic Flow Rates

Circuit	Standard	Metric
Hitch Lift	10 gpm	37.9 L/m
Rear Strut Lift	7.5 gpm	28.4 L/m
Top Door Lift	5 gpm	18.9 L/m
Row Finder Constant	7.5 gpm	28.4 L/m
Row Finder Override (7 RF constant)	10 gpm	37.9 L/m
Scalper Lift / RF Lift	7.5 gpm	28.4 L/m
Front Stabilizer Struts	5 gpm	18.9 L/m
AHC	17 gpm	64.4 L/m

NOTE: Values listed are a good starting point; however, flow rates should be fine-tuned to allow the smallest flow rate possible while still providing enough power to run the defoliator properly.

3.4 Tractor Specifications

Table 3-4: Tractor Specifications

Model:	3750	3550	3450	3700	3500	3300	3200
Minimum recommended tractor HP (PTO)	300 hp	180 hp	150 hp	200 hp	130 hp	100 hp	100 hp
Min. Tractor Weight**	25,720 lbs [11,666 kg]	22,380 lbs [10,151 kg]	19,500 lbs [8,845 kg]	23,050 lbs [10,455 kg]	20,340 lbs [9,226 kg]	16,950 lbs [7,698 kg]	16,610 lbs [7,534 kg]
PTO Output	1000 rpm	1000 rpm	1000 rpm	1000rpm	1000 rpm	1000 rpm	1000 rpm
Spline Size	1¾" 20 Spline	1¾" 20 Spline	1¾" 20 Spline Or 1⅜" 21 Spline	1¾" 20 Spline	1¾" 20 Spline Or 1⅜" 21 Spline	1¾" 20 Spline Or 1⅜" 21 Spline	1¾" 20 Spline Or 1⅜" 21 Spline
Hydraulic Pressure	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]	2700 psi [186.16 bar]
Number of Remotes*	5	5	5	6	6	5	5

The specifications above are estimates and may vary with conditions.
*Number of remotes required depends on options equipped
** Calculated per ASABE 5648-4

3.5 Rotor Design

Figures 3-1, 3-2, and Table 3-5 below show drum rotational speeds (at full tractor RPM), directions and configurations for Amity Defoliators.

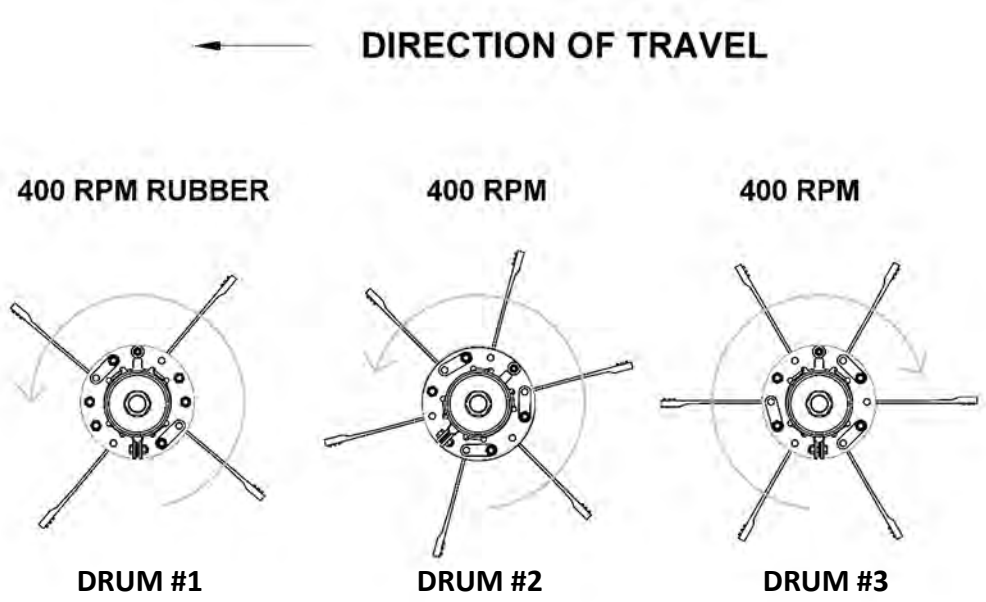


Figure 3-1: Rubber Front Drum

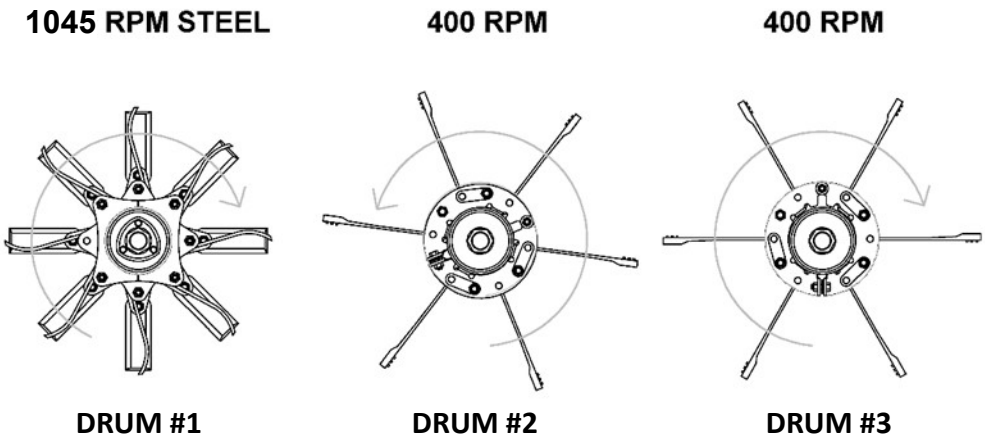


Figure 3-2: Steel Front Drum

Table 3-5: Rotor Design

Drum	00 Series	50 Series
Drum 1 (Front)	Steel -OR- 4 Flail rods	Steel Combination
Drum 2 (Center)	6 Flail rods per assembly	10 Flail rods per assembly
Drum 3 (Rear)	6 Flail rods per assembly	6 Flail rods per assembly

4.0 PREPARATION

4.1 Tractor Preparation

4.1.1 Adjusting the Drawbar: It is recommended that the tractor drawbar be set to the shortest position and be within the given range (in accordance with ANSI/ASABE AD6489-3) to maintain the integrity of the drive system. Dimensions are shown in Figure 4-1.

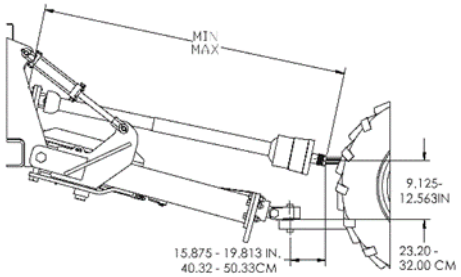


Figure 4-1: Drawbar Range

PTO PART NUMBER	DESCRIPTION	MINIMUM DISTANCE	MAXIMUM DISTANCE
306403	PTO-STD 1-3/8"-21 (DEF)	54.00in / 137.16cm	76.88in / 195.27cm
306404	PTO-STD 1-3/4"-20 (DEF)	54.00in / 137.16cm	76.88in / 195.27cm
305690	PTO-CV 1-3/4"-20 DEF HEAVY	59.67in / 151.56cm	82.92in / 210.61cm
305691	PTO-STD 1-3/4"-20 DEF HEAVY	57.90in / 147.00cm	82.78in / 210.26cm
69678	PTO-STD 38MM-8 (DEF)	53.82in / 136.70cm	76.50in / 194.31cm
69681	PTO-CV 1-3/8"-21 (DEF)	56.50in / 143.41cm	77.28in / 196.29cm
69682	PTO-CV 1-3/4"-20 (DEF)	57.00in / 144.78cm	77.80in / 197.62cm

IMPORTANT: Ensure the driveline remains within operating range under all conditions.

4.1.2 Tire Spacing and Inflation: Tires should be inflated to the manufacturer's specification. See Section 3.3, Traction, for more information. Figure 4-2 shows the appropriate tire spacing.

A = 3 or 4 * B

B = Row Spacing

C = Tire Width; must be as narrow as possible.

IMPORTANT: Tires must be narrow enough not to contact beets when driving down rows while still providing enough traction to pull the defoliator.

NOTE: The Front tires must be aligned with the rear tires.

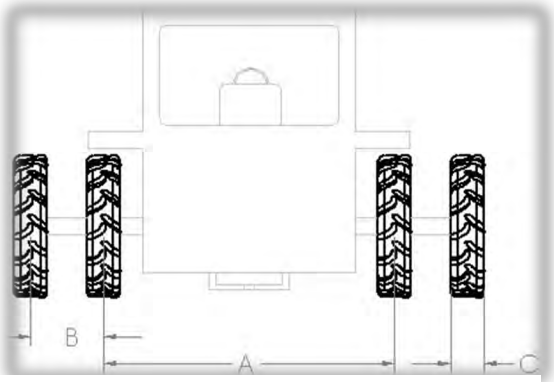


Figure 4-2: Tire Spacing

4.1.3 Three-Point Hitch Position: Three-point hitches cannot be connected to the hitch when using a defoliator. It must be fully raised or removed.

NOTE: Amity recommends **removing** three-point hitches.

CAUTION: Ensure the receiver and drawbar support arms clear the PTO driveline under all conditions.

Figure 4-3: Fully Raised Three-Point Hitch

4.2 Defoliator Preparation

4.2.1 Flail Spacing: Verify the spacing matches the spacing of the planted crop as shown in Figure 11.

A=B/2 Center of frame to center of flail basket
B=Row spacing

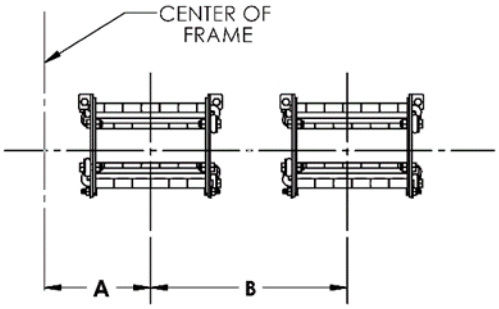


Figure 4-4: Flail Spacing

4.2.2 Scalpers: In addition to flail baskets, scalpers also need to be correctly positioned for row spacing and should be adjusted to match if they are not already. For additional adjustment refer to section 7.0 Adjustments, for proper setup of the scalpers including basket height and scalper knife position.

4.2.3 Shield Placement: Before starting, be sure to secure the shields in operating position (closed position).

4.2.4 Gearbox Oil Level: Check all gearbox oil levels before operating. Refer to section 11.0, Lubrication and Maintenance, for oil type and fill level information.

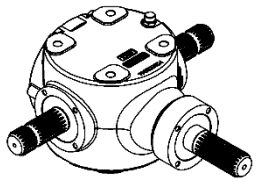


Figure 4-5: Gearbox

4.2.5 Greasing: Refer to section 11.0, Lubrication and Maintenance, for grease type and frequency requirements. Ensure all components have been greased per guidelines before preliminary start-up.

IMPORTANT: Use only hand held grease guns. Air-powered grease guns can damage your seals. Over greasing may also damage bearing seals. If damage due to over greasing occurs, replace the damaged seals immediately.

4.2.6 Attaching PTO driveline to Defoliator:

1. Remove the gearbox shield access covers.
2. Connect the PTO driveline to the gearbox spline shaft.
3. Lock the PTO in place using two $^{5}/_{8}$ in. bolts and nuts installed through the groove in the gearbox shaft.
4. Replace shield access covers.

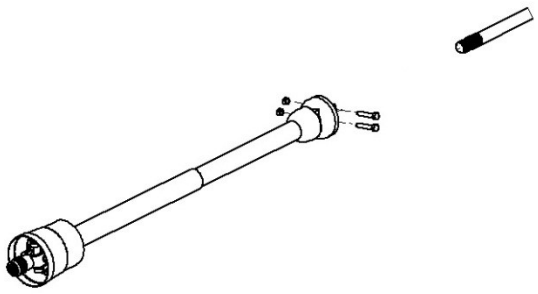


Figure 4-6: Attaching PTO to Defoliator

5.0 ATTACHING AND DETACHING

5.1 Attaching Hydraulic and Electrical Systems

Defoliators are available with ISO couplers or metric adapters. If the hydraulic attachments on your defoliator do not fit the tractor, contact your Amity dealer.

CAUTION: To avoid injury from escaping fluid under pressure, relieve the pressure in the system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

Figure 5-1: Attaching Hydraulic Lines

1. Shift to park, shut off the engine, and remove the ignition key before getting out of tractor.
2. Connect all hydraulic lines to tractor as shown in Figure 5-1.
3. Connect the defoliator warning light harness to the tractor. Make sure the defoliator warning lights operate with the tractor warning lights and turn signals.

5.2 Attaching Defoliator to Tractor Drawbar

Figure 5-2: Attaching Defoliator to Tractor Drawbar

1. Adjust the tractor drawbar (see Tractor Preparation, section 4.1.1).
2. Remove the tractor hitch pin.
3. Install required bushings into pull plate.
4. Adjust the hitch height.
5. Shift to park, shut off the engine, and remove the ignition key before getting out of tractor.
6. Line up the pull plate with the drawbar.
7. Place hardened washer between the drawbar and pull plate, and install shims as necessary.
8. Lubricate and reinstall the hitch pin.
9. Connect the safety chain to the drawbar supporting structure.

5.3 Attaching PTO Driveline

CAUTION: To avoid bodily injury or death, shut off the tractor and lower the machine to the ground before attaching the PTO driveline.

IMPORTANT: Keep the driveline and powershaft splines clean of dirt, paint, and debris.

Figure 5-3: Attached PTO Driveline

1. Shift to park, disengage the PTO, lower the machine to the ground, relieve hydraulic pressure, stop the engine, and remove the ignition key.
2. Raise the tractor PTO shield.
3. Lubricate splines on tractor PTO output shaft.
4. Pull back on the PTO collar until it latches.
5. Align the splines between the defoliator driveline and the tractor PTO shaft. Push the driveline onto the shaft until the collar snaps forward on the yoke.
6. To ensure the PTO is secure, pull back on the shield. Do not pull on the collar, as this will release the latch.
7. Lower the tractor PTO shield.

5.4 Using Stands

CAUTION: Always use stands when working on, near, or underneath the defoliator.

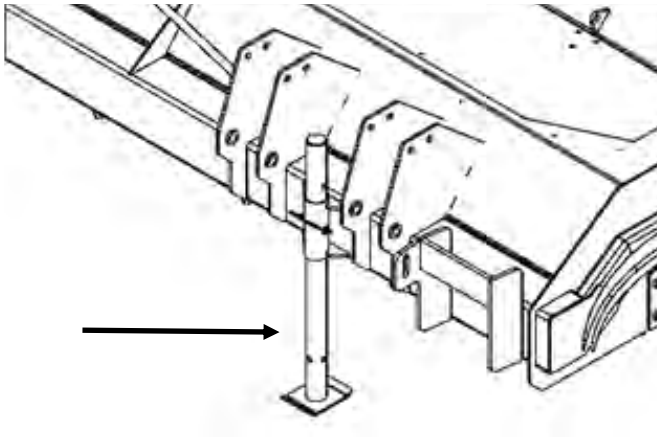


Figure 5-4: Amity Stand

6.0 OPERATING THE DEFOLIATOR

6.1 Startup

1. Lubricate the machine per the schedule outlined in the maintenance section.
2. Perform pre-operation check of the defoliator.
3. Ensure that you, bystanders, and all objects are clear of the defoliator before starting.
4. Align the tractor and defoliator with the first set of rows to be defoliated.
5. Lower the defoliator to working position against the cylinder stops and check that flail height from drums #2 and #3 is above of the ground and approximate ½" (1.2cm) below the crown of your average beet height for a starting position.
6. Partially raise the defoliator ensuring all flails are clear of the ground.
7. Throttle down to low idle.
8. **Double check that bystanders are clear and slowly engage the PTO. (On tractors with electronic engagement set to the slowest or softest engagement setting level.)**
9. Smoothly increase to 1000 PTO RPM.
10. Lower the defoliator to the pre-set operating height and proceed down the field.
11. If this is a new field or the conditions have changed, stop the machine after 25-50 feet (7.5-15 m) and check the quality of job being done. If required adjust the defoliator using adjustment guide and reassess defoliation quality after adjustment. Make adjustments until defoliation is satisfactory.
12. Proceed with work; reassess defoliation with field, variety or condition changes.

 **CAUTION:** Never engage the PTO unless the engine is at low idle. Faster speeds may overload drivetrain components or break the shear pin.

6.2 Flail Height

The single biggest factor in quality defoliator is properly setting the flail height of drums #2 and #3 of your Amity defoliator. Flail height will vary with soil and crop conditions. One inch (2.54 cm) below the crown of the average beet is a good starting point. Actual flail height is best determined by checking the defoliation results in several areas after defoliating for 50 feet (15 meters). To maintain even cleaning **it is important for the flail height of the 2nd and 3rd drum to be the same**; running the defoliator level will ensure this. Raise or lower the flail height as required and recheck by defoliating for another 50 feet. Repeat this process until flail height results in a satisfactory defoliation job.

See section 7.0 for additional detailed adjustment procedures.

IMPORTANT: Defoliation height will change drastically with field conditions and beet variety. Adjusting for changing conditions is necessary for optimal defoliator performance.

IMPORTANT: In situations with loose beets adjust the flail height as high as possible while maintaining a quality defoliator job to minimize knocking beets out of the row.

6.3 Field Operating Speed

Proper travel speed is critical in quality defoliation and changing speed will affect the performance of the machine and needs to be matched to field conditions and machine set-up. The defoliator should be operated at speeds specific to the conditions; typical speeds are 2-4 mph (3.2-6.5 kph) for 00 Series and 3-6 mph (4.8-9.7 kph) for 50 Series.

- Increase speed when beet tops are clean of petioles and flails are beginning to damage tops. To optimize defoliation, continue to increase speed until defoliator begins to leave petioles on beet tops; decrease slightly from that point to maximize speed and cleaning.
- Maintain current speed when beet tops are clean of petioles and free of any flail damage
- Decrease speed when beet tops are not satisfactorily clean of petioles and correct flail height for both #2 and #3 drums have been verified.

IMPORTANT: On beets that are significantly lower than average, not all petioles will be able to be reached by the defoliator flails and will not be 100% free of petioles. Please take this into consideration when determining defoliation quality.

6.4 Turning Radius

Turning at the end of the field while pulling the defoliator requires a wide area. One way to accommodate the large turning radius is to plant headland rows. Amity recommends a minimum of 48 headland rows (22" [56 cm] spacing) on each end of the field.

- Defoliators equipped with a CV PTO driveshaft should remain under power while turning in the headlands.
- Defoliators equipped with a Standard PTO driveshaft need to disengage the PTO before turning to prevent driveline damage.

IMPORTANT: Failure to provide a sufficient turning radius for the tractor and defoliator may lead to damage of the driveshaft, row finder assembly, scalpers, stabilizer struts and/or tractor tires.

6.5 Break-in Period

After an initial 30 minutes of normal field operation, hand check all fasteners and components. Tighten or adjust any components as required. Do not re-torque gearbox hardware as they have been installed with thread lock compound. If any gearbox hardware is found loose it should be fully removed threads cleaned and reinstalled with thread lock to the torque spec as listed in section 11.0 Lubrication and Maintenance.

6.6 Field Cleaning

The defoliator will build with mud at different rates during operation depending on soil conditions. It is important to fully open all doors, check material build up, and clean the machine if required every two hours or more often if the conditions demand.

IMPORTANT: If left unclean, mud may clog the machine and may cause damage or premature component wear. Frequently clean the machine to avoid potential damage and premature wear.

6.7 Flail Tubes

Amity offers many flail styles in row widths ranging from 18 to 36 inches (45 to 90cm). Flails can be set up with all rubber flails (00 series only), or with a steel front drum with rubber flails on drums #2 and #3. Steel flail tubes operate at 1045 rpm and are factory balanced. Rubber equipped flail tubes operate at 400 rpm and do not require balancing due to the lower operating speed. Flails may be specifically matched to each growers needs. Please see your local Amity dealer or refer to your parts manual for different flail options available.

6.7.1 Adjustable 2nd & 3rd Drum (50 series): The purpose of the adjustable 3rd flail tube in the 50 series defoliator is to be able to run the 1st drum higher specifically designed for crops with poor emergence where the highest beet and lowest beet vary greatly in height. In such a situation running the defoliator level and low enough to clean all beets the 1st drum would cut the tops off many of the higher beets. Typical conditions do not warrant adjustment of the 3rd drum. If they do, adjusting the 3rd drum should be done in ¼" (.6cm) increments and directions can be found in Adjustments section 7.0.

6.8 Leveling

Two things affect a defoliator's field level; machine setup and field conditions

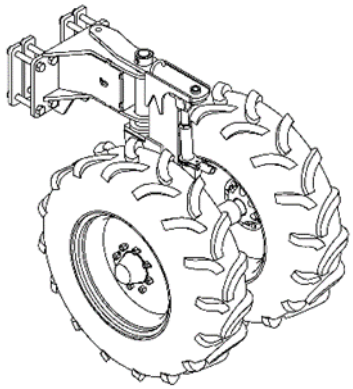


Figure 6-1: Rear Strut

6.8.1 Machine Setup

The first thing that impacts the defoliator field level is the actual machine level setup from side to side. This is affected by tire pressure, machine weight and rear strut adjustment. To ensure the machine is level, a onetime level check/setup should be performed on a flat and level floor following the guidelines laid out in section 7.0.

6.8.2 Field Conditions

The second thing that impacts the defoliator field level are the field level conditions. This is affected by planter and sprayer tracks left in the field. It is best to adjust the defoliator wheel locations to avoid running on the same rows as the planter or sprayer tracks. In cases where this cannot be avoided, one tire should be run off the tracks from the planter or sprayer and the rear struts moved out as wide as practical to lessen the impact on machine level.

6.9 Row Finder (option):

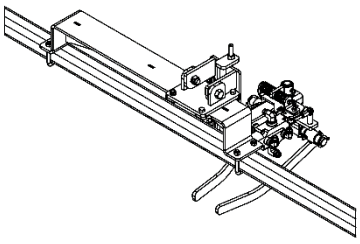


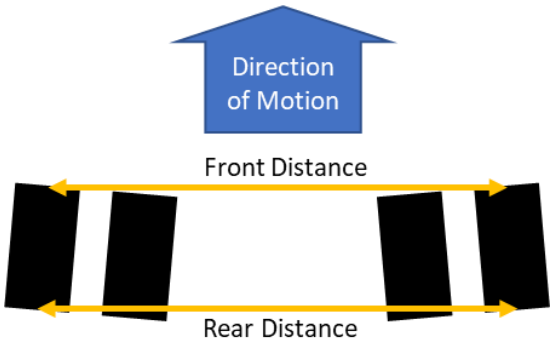
Figure 6-2: Row Finder

Amity defoliators with steerable struts have the option of a hydraulic row finder. The row finder helps keep the defoliator flails directly in line with crop rows. Row finder hydraulic flows should be set so the override is greater than contrast. The override circuit flow may be adjusted up or down to adjust to desired steering response time. The row finder should be lifted when the defoliator reaches the headland before turning and only lowered once the defoliator is back into the beet rows so the row finder lands onto a row. Lowering too soon may cause the defoliator to miss the row and push the machine off the row instead of keeping it on. If the row finder gets off the row use the manual override to steer back onto the row.

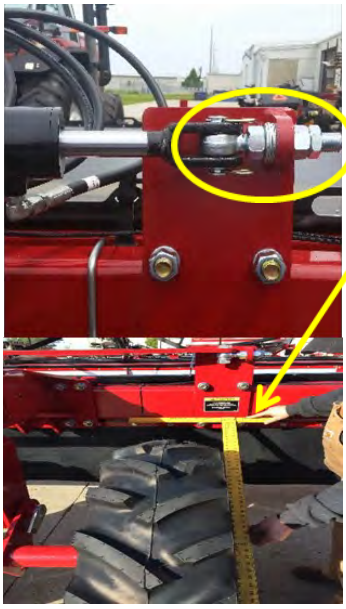
6.9.1 Tire Toe-In and Hitch

First, it is crucial that the hitch is square. Using the ratchet jack, first adjust the hitch until it makes a right angle with the crossbar as seen on the right. Note the use of the square along the hitch.

Next, adjust the toe-in angle.



When adjusting the toe-in angle on the rear struts, first measure the distance between the middles of the outside tires as seen in the image below. Repeat measurement for the front of the same tires. This measurement should be at least one inch less than that of the rear.



The first step is to adjust the cylinder eyebolt as pictured so that the wheel set is toed in one half inch. Use the square to do this as shown.

Next, adjust the rear tie rod to turn the other wheel set inward. Once again, use the square to visually judge this.

After doing so, assure the one inch difference between the front and rear of the outside tires.

6.10 Guidance Steering Mount (option):

John Deere implement guidance systems are compatible with any Amity defoliator that has rear steerable struts. Amity offers an optional kit that can be paired with these guidance systems to simplify the mounting process and make it easier to add to the machine. The kit includes mounting brackets for the GPS globe, and the steering sensor.

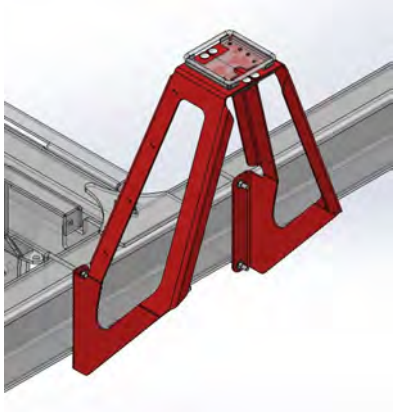


Figure 6-3: Globe Mount

NOTE: The John Deere GPS globe, globe quick attach bracket, controller, and harness are not included as part a part of the kit or offered by Amity in any way.

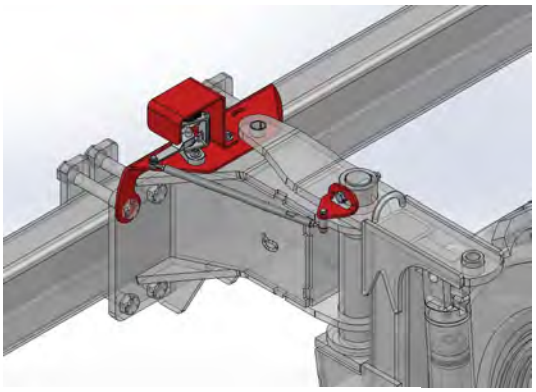


Figure 6-4: Steering Sensor

6.11 Scalpers (option):

Scalpers are an option on Amity defoliators that remove the very top of the beet helping to ensure complete petiole removal. Scalper are designed to ride on the crown of the beet to follow its changing height. Because of this they need to be raised in addition to the row finder at the field end just as the beets are ending. They should only be lowered again once the defoliator is turned around and as it starts to defoliate the next set of rows. Not raising or lowering the scalpers at the appropriate time in addition to possibly damaging the scalpers can cause the knives to plug with mud and not function correctly requiring the operator to stop of the defoliator in order to clean them. Finally, it is imperative that scalpers are lifted whenever the defoliator is reversed as this may cause damage to scalper knives, baskets and lift. See section 7.0 Adjustments for setup guide.

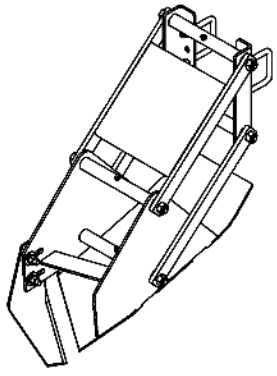


Figure 6-5: Scalpers

CAUTION: Raise scalpers at headlands. Never back up the defoliator with the scalpers in the lowered position as this may cause damage to scalper lift and or scalper baskets.

IMPORTANT: Properly setting the scalpers is critical to not wasting any sugar beet, or damaging the scalper assembly.

6.12 Machine Shutdown

To ensure maximum life of the machine, follow this procedure when stopping:

1. Raise the defoliator off the beets with the PTO still engaged. (If equipped with AHC, activate end row mode)

2. While PTO is running at full speed or high idle, disengage tractor PTO. The corner gearbox on all Amity defoliators has an over-running clutch built in and will allow the defoliator to slowly come to a stop well after the PTO drive on the tractor has stopped.

3. Do not exit the tractor until flails have come to a complete stop.

CAUTION: When shutting down or reducing ground speed, the PTO must remain turning at full RPM until PTO is disengaged. Lowering RPM with PTO still engaged can cause the overrunning clutch to disengage and reengage and can result is failed driveline shear bolts.

7.0 ADJUSTMENTS

Before performing any adjustments first shift to park, disengage PTO, lower machine to ground, relieve hydraulic pressure, stop engine, remove ignition key, and wait for all moving parts to stop before adjusting.

7.1 Leveling

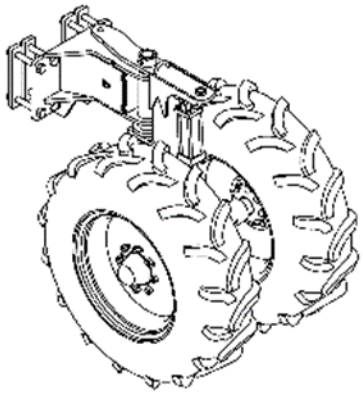


Figure 7-1: Leveling Adjustment

To obtain optimal performance of the defoliator, the machine must be level from left to right while defoliating. Critical to maintaining machine level is rear strut style and location. Selecting a strut style and tire location that do not run in previous tractor and sprayer tracks will greatly help the ease of maintaining field level and increase defoliation quality. Rear struts design is flexible so that they can be located for best performance. Because of your Amity defoliator's unique and low maintenance gearbox drive system, the right side of the defoliator is inherently heavier which will affect side to side level. Amity defoliator's come with weights mounted on the left side to counteract this; however depending on the options equipped an additional 100-300 lbs. (45-135 kg) can be added to the weight bracket on the front left corner to achieve a perfectly balanced machine. Instead of the preferred method adding weights, you may also adjust air pressure in your tires. Starting with all tires at the recommended pressure (see Section 3.0 Specifications) adjust pressure up on the right tires and proportionally down on the left tires until the distance from bottom of the axle tube to the floor is equal on both sides which indicates the static loaded radius of the tires is the same. (Not recommended for defoliators with optional 4 struts) Once the weight bias on your Amity defoliator is accounted for, check flail distances from a flat and level floor. If additional adjustment is required to level the defoliator please follow the procedures laid out below:

7.1.1 Manual: (Rear struts equipped with ratchet jacks for adjustment.

1. Move the defoliator on to a flat and level floor for accurate measurements.
2. Lower the defoliator front hitch cylinders to approximate operating height.
3. Check tire pressure to ensure both sides are correctly inflated.
4. Measure the distance between the drum #3 flails and ground, or rear frame tube and ground on the very outside of the left and right hand sides of the defoliator
5. To level the defoliator, choose the side which is closest to the desired height. Then adjust the rachet jack on the opposite side until the machine is level.
6. Future height adjustments should be made in equal amounts on both struts to maintain level.

7.1.2 Hydraulic Strut Lift (option): (Rear struts equipped with rephasing cylinders.)

1. Move the defoliator on to a flat and level floor for accurate measurements.
2. Lower the defoliator front hitch cylinders to approximate operating height.
3. Check tire pressure to ensure both sides are correctly inflated.
4. Measure the distance between the drum #3 flails and ground, or rear frame tube and ground on the very outside of the left and right hand sides of the defoliator and record distance.
5. Jack up the corner of the frame to remove the load from the strut assembly and the tires. Securely block the frame with suitable jack stands or wooden blocks.

Figure 7-2: Rear Strut Height Adjustment

6. Remove the lower cylinder pin and loosen the bolt clamping the cylinder clevis end to the rod.
7. Screw in the cylinder clevis end on the side that is high until machine is level.
8. Retighten clevis and replace pin.
9. Lower frame to ground and confirm level. Repeat steps 5-8 if required.

7.2 Height

Follow the guidelines below for initial setup and adjustment of defoliator height.

7.2.1 Initial height set-up

1. Move the defoliator to a flat and level floor.
2. Lower the defoliator front hitch cylinders to approximate operating height.
3. Evenly lower the rear struts to approximate operating height.
4. Start with both 2nd and 3rd drums at the same height with flails approximately 1 inch below the average height of an estimated beet crown.
5. Install as many cylinder depth stops as possible evenly in both front cylinder and rear cylinders if equipped.
6. Lower cylinders onto depth stops and check initial setting.
7. Add additional depth stops to level machine and set height to desired level.

7.2.2 Field Height adjustment and AHC adjustments

1. With defoliator set to initial height estimate follow section 6.1 Start Up for beginning a new field.
2. Run the defoliator for 25-50 feet (7.5-15 m) at a slow speed.
3. Following adjustment safety procedures, stop and raise the defoliator.
4. Once all moving parts have stopped, exit the cab and assess the defoliation performance.
5. Make height adjustments as needed by adding spacers or adjusting the ratchet jacks depending on options equipped. For AHC, adjust heights by using the screen to change the rear height and/or hitch height values on the home screen, or the left/right offset on the advanced options screen. Use the following guidelines:
   a. Flails hitting dirt – raise rear struts/increase rear height value
   b. Front flails cutting top off beets – raise front hitch/increase hitch height value
   c. Beet crown not clean – lower rear struts/decrease rear height value
   d. Front crown of beet not clean while rear is – lower front hitch/decrease hitch height value
   e. Rear crown of beet not clean while front is – lower rear struts & raise front hitch/decrease rear height value & increase hitch height value
   f. Beet crown damaged – increase speed and reassess
   g. Beets being pulled out of ground – raise rear struts/increase rear height value
6. Make adjustments as needed and operate the defoliator for another 25-50 feet (7.5-15 m) until satisfied with defoliation results.
7. Increase speed until defoliation job begins to worsen, then slow down slightly to optimize travel speed and performance.

CAUTION: Never set the flails to hit the ground. Ground contact will damage flails and cause premature wear. Cylinder stops should be used at all times to prevent flail to ground contact. Flails can pick up stones and other debris and expel them out of the machine with enough speed to injure a person. Maintain a safe distance and never stand in front or behind of a running defoliator.

NOTE: A 1 in. (2.5 cm) stop in a rear cylinder provides approximately 1 in. (2.5 cm) of lift. A 1 in. (2.5 cm) stop on the front hitch provides approximately 3.25 in. (8.26 cm) of lift.

IMPORTANT: Properly setting height is the most important factor in the performance of your Amity defoliator. Height should be checked and changed if needed every time field, variety or conditions change.

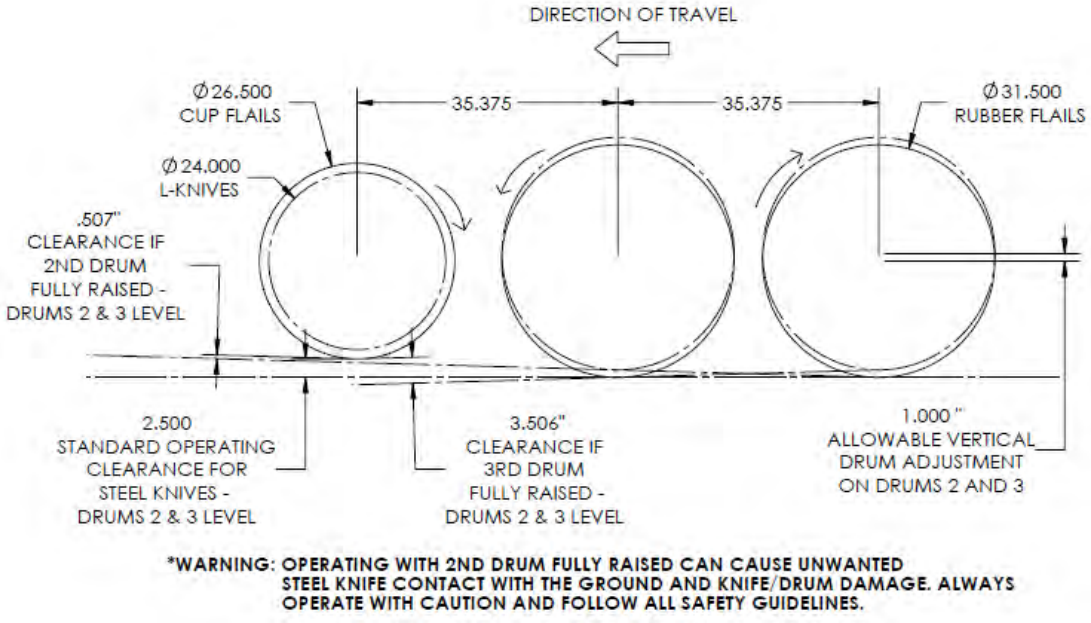


Figure 7-3: Defoliator Drum Flail Size

7.2.3 Flail Size Drum 1 height as shown in Figure 24 above is designed to run higher than the rear drums 2&3. This is based on its function which is to remove the majority of the beet leaves leaving only a few petioles or leaf stems for the 2nd and 3rd drums to remove from the crown of the beet. The rear two drums which are designed to be run level with each other, counter rotate so the flails hit from different directions to clean the front and back of the beet crown as illustrated in Figure 25 below. This is where the 50 series and 00 series differ significantly and described in the following sections.

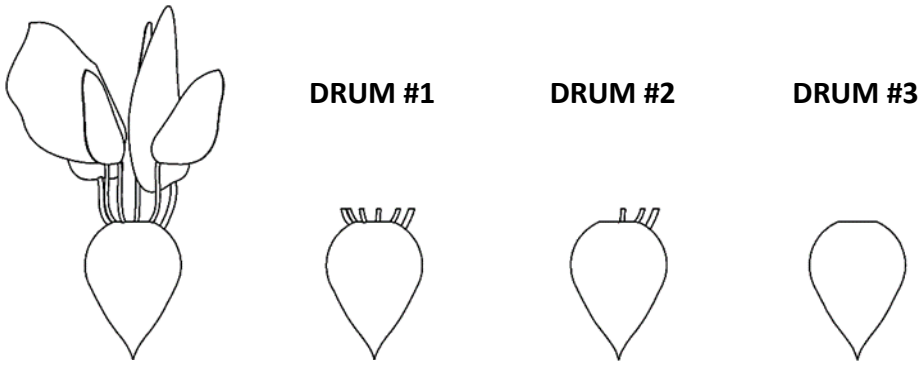


Figure 7-4: Defoliation Process

7.2.4 (50) Series The design feature that enables the 50 series defoliator to do more work faster is the shrouded front steel drum 1. The shrouded drum 1 is able to remove the majority of foliage leaving only a couple of inches of petioles and keeping the rear drums clear of excess leaves allowing them to perform their jobs more effectively. Drum 2 rotates with the direction of travel its job is to the clean the front side of the beet as shown in Figure 25. The 2nd drum has 10 sets of flails compared to the 6 of the rear drum because of the rotational direction makes for a less aggressive cleaning action. Drum #3 rotates against the direction of travel used 6 sets of flails and its flails contact the back half of the beet removing the final petioles from the beet crown. By looking to see where the petioles remain will let you know if the 2nd, 3rd or both drums need to be raised or lowered. Lower or raise the hitch to adjust for level and lower rear struts to adjust drum 2 and drum 3 flail height. Both hitch and rear strut adjustments will affect the other drum so double check flail heights for both drums after making any adjustments.

7.2.5 (00) Series 00 series defoliators do not have the front shroud that the 50 series have and because of this the front drum doesn't do as much work, leaving more petioles and even some leaves for the 2nd and 3rd drums to clean up. Similar to the 50 series the 00 series defoliator needs to run level with both the 2nd and 3rd drums at the same height; however the 2nd drum (because of the increased petioles) will not be able to clean the front of the beet by itself, and needs the 3rd drum to help. In order to do that travel speed must to be decreased so additional strikes are made by the flails to each beet crown to perform the quality of job desired. Adjustments are performed in the same manner with the front hitch adjusting machine level and the rear struts raised or lower to adjust for flail height.

7.2.6 Loose Beets In some conditions beets may be knocked loose from the ground which prevents them from being harvested. The best way to minimize this is to raise the flail height as high as possible while still removing the petioles. This will provide less aggressive impacts to the beet. Adjusting travel speed doesn't help much and in some cases will be worse for this condition as the tangential velocity of the flails is much greater than any fractional change from reducing travel speed.

7.2.7 2nd & 3rd Drum Height (50 series only)

On all 50 series Amity defoliators the 3 drum can be adjusted upwards. When the defoliator is level, the front steel drum 1 is 2.5 inches (6cm) higher than rubber drums 2 and 3. The purpose of drum 3 being adjustable is for poor beet stands where beet height varies drastically. In this situation, running the defoliator level might cause the front steel flails to damage the larger beets.. Raising the 3rd drum allows the operator to lower the rear of the defoliator and raise the front (drum 1) higher. This adjustment may also be used to account for flail wear.

To adjust the 3rd drum upwards:

1. Third drum height may be raised up to 1 inch (2.5 cm). In ¼ inch (.6cm) intervals.
2. Determine desired amount to raise the third drum.
3. Loosen bolts on gearbox, center hanger plate and end hanger plate as pictured below.
4. Lift gearbox upwards with eyebolt until it is high enough for desired height.
5. Remove spacers from the storage location on top of drum two.
6. Place the desired spacers underneath gearbox three in from each side.
7. If two or more spacers are used remove the standard bolts and swap them with the longer bolts used to hold the spacers on top of gearbox two.
8. Apply Loctite 243 and torque gearbox bolts to the spec listed in Section 11.6.
9. With gearbox adjustments complete, the center hanger plate and end hanger plate need to be adjusted to match.
10. Starting with the center hanger plate shown in Figure 27 take a measurement of the current position.
11. Using the eyebolts raise the plate until the measurement matches the height the gearbox was raised.

Figure 7-5: Gearbox 3rd Drum Adjustment

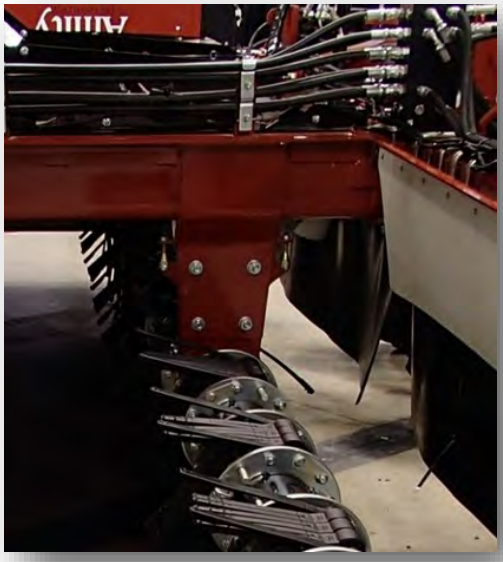


Figure 7-6: Center 3rd Drum Adjustment

12. Tighten the 4 5/8” bolts locking the hanger plate into place.

13. Repeat steps 9-12 for the outer plate shown in Figure 28.

14. Run the defoliator with the updated drum 3 height and recheck that bolts are tight after 1 hour of operation.

Figure 7-7: Outer 3rd Drum Adjustment

7.3 Row Finder

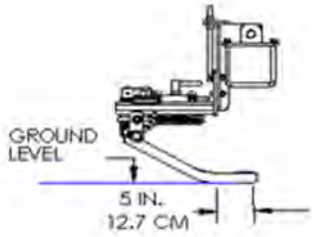


Figure 7-8: Row Finder Wand Placement

When defoliating, the row finder wands should be adjusted like Figure 7-8 such that there is 5 in. (12.7 cm) of contact between the ground and row finder wands. Adjustment spring (B), shown in Figure 7-9, can be adjusted to apply more down pressure to ensure constant contact with the beet row.

Likewise, the row finder wands should be angled down when lifted out of the ground as shown in Figure 7-9. Dimension (A) can be adjusted using nuts (D).

Adjusting Height (E):

1. To change height (E) of the row finder, loosen bolts (C).

2. Adjust jam nuts (G) to desired height.

3. After adjusting height (E), retighten bolts (C).

NOTE: The wands should be angled down slightly when the machine is out of the ground. This will create down pressure from spring (B) when the machine is lowered to digging depth.

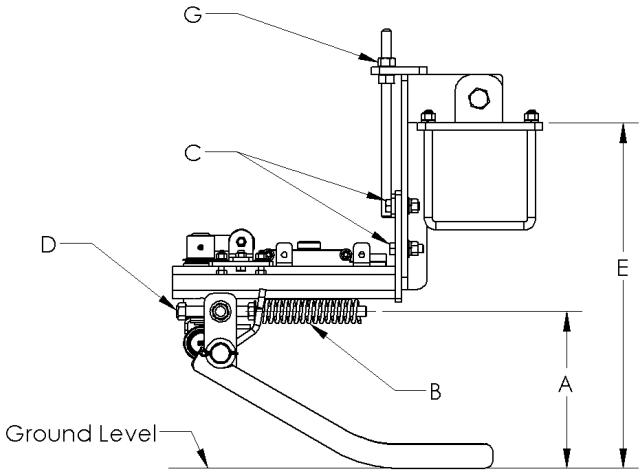


Figure 7-9: Row Finder Adjustment

7.4 Row spacing

Row Spacing: Normally row spacing is set once from the factory and will not need to be changed unless the customer changes crop spacing.

A=B/2 Center of frame to center of flail basket
B=Row Spacing

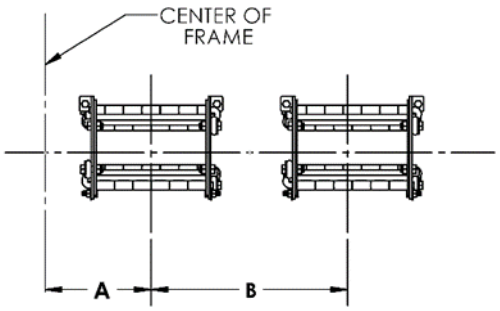


Figure 7-10: Row Spacing

7.4.1 Flail spacing

Steel Flail adjustment:
Amity Steel flails are used on the front drum only and spin at 1045 RPM and are balanced from the factory. All steel flails are either full width (L-knife and Cup knife) and do not need to be adjusted when changing row spacing or they are welded at a specific row spacing and are not adjustable (50 series and over the row cup flails). Please refer to your Amity parts manual for the appropriate replacement if required.

Rubber Flail adjustment: (Refers to Studded, Tapered, Split, Block, and Sweep flails)

1. Open defoliator top doors for access to flails
2. Determine the required flail position by measuring from the center of the machine.
3. Mark the center position required for each flail basket.
4. Loosen the flail basket bolts clamping the rings onto the drum.
5. Slide the assemblies to the desired position on the drum.
6. Retighten flail ring bolts securing the basket to the drum.

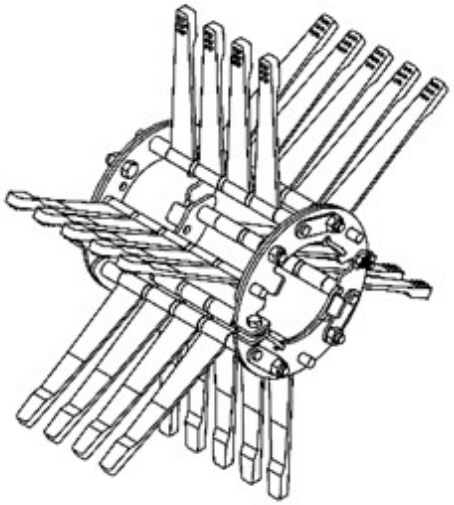


Figure 7-11: Rubber Flail Bas-

7.4.2 Wheel Spacing

The rear struts spacing are set at the factory and are designed to be adjustable to fit 18 to 44 inch (45 to 112 cm) row spacing depending on the strut style equipped. Minimum row and crop damage will be done if the tires are set to track in the center of the rows. Wheel spacing adjustments are made by moving the spindle in or out utilizing different cross-holes in the rear strut, or by reversing the switch the tires which changes the offset in or out. Any wheel adjustments need to be made in conjunction with the strut assembly as a whole from the machine center. Always space the tires first as some spacing widths will end up offset from the center of the strut.

Set up wheel spacing as follows:

1. Measure the current wheel spacing and determine how far in or out the wheels need to be adjusted.
2. Jack up the corner of the frame to remove the load from the strut assembly and the tires.
3. Remove wheels and cross bolts as necessary
4. Use chart below to set desired wheel spacing.
5. Torque wheels to 125 foot pounds and re-torque after 1 hour of field use. Lug bolts should be checked periodically and tightened if needed.

<u>11.2-24 22” Tire</u>
22” Wheel offset in; Inner spindle holes
24” Wheel offset in; Outer spindle holes
*26” Outer tire wheel offset out / Inner tire wheel offset in; Inner spindle holes
*28” Outer tire wheel offset out / Inner tire wheel offset in; Outer spindle holes
30” Wheel offset out; Inner spindle holes
32” Wheel offset out; Outer spindle holes

<u>11.2-24 44” Tire</u>
44” Wheel offset in

*Wheel setting results in a wheel spacing which center is 2" (5 cm) out from the center of the strut which needs to be taken into account when setting strut spacing. In addition to maintain the proper tire lug orientation if switching to 26" or 28" (66 or 71cm) spacing one tire from the left hand strut needs to be switched with one tire from the right hand strut.

7.4.3 Strut Spacing

Strut spacing is set at the factory but can be adjusted to avoid planter or sprayer tracks in your fields, or if your operation changes row widths. Rear struts should be spaced to avoid running in planter tracks when possible. Often it is not possible to avoid planter or sprayer tracks in which case at least one tire should be off the tracks from the planter or sprayer and the rear struts moved out as wide as practical. Having one strut follow were a previous wheel track has been made can make it very difficult to maintain a level defoliator which can result in a poor defoliation job.

Set up Strut spacing as follows:

1. Measure from the center of the frame to determine new strut spacing and mark the rear tube.
2. Jack up the corner of the frame to remove the load from the strut assembly and the tires. Securely block the frame with suitable jack stands or wooden blocks.
3. Loosen one inch strut bolts securing the rear struts to the rear frame tubing.
4. If struts are steerable loosen the bolts attaching the steering cylinder to the rear frame tube. In addition the tie rod clamp will need to be loosened and cross bolt removed.
5. Slide the assembly along the frame until the correct strut spacing is achieved.
6. Tighten the mounting bolts evenly.
7. Repeat with the other side
8. On Steerable strut units after both struts have been adjusted reinstall the tie-rod cross bolt in the appropriate hole and tighten the tie-rod clamp in place. Tie rod length may need to be adjusted with the end links to ensure both struts are straight, see section 7.5.

7.5 Steerable Struts

Figure 7-12: Steerable Struts

To adjust your steerable struts so they are tracking straight:

1. Start with the strut that is attached to the steering cylinder, typically the right strut.
2. Check for straightness by setting a straight edge against the steering weldment and check for alignment with the frame mounted weldment.
3. If they are not aligned, loosen the jam nuts on the eyebolt locating the cylinder and adjust the eyebolt in or out until they are properly aligned.
4. For defoliator models not equipped with an eyebolt for adjustment the bolts affixing the cylinder plate to the rear tube will have to be loosen and retightened after the strut is aligned.
5. With that complete check for alignment on the other strut in the same manner.
6. To adjust the other side loosen the locking nuts on both sides of the tie-rod.
7. Turn the tie rod to adjust in or out.
8. Once proper alignment is achieve re-tighten the nuts locking the tie-rod length.

7.6 Scalpers

Scalpers are designed to remove the last of the petioles from the beet and a small portion of the crown reducing impurities in beet piles. Properly setting up scalpers is critical in their performance. Baskets should be set so that they do not hit either the top or bottom limit of their operational range while defoliating. The stop at the bottom of the range purpose is only for holding the scalper basket up when the scalper bar is lifted. To maximize adjustment range the lower set of holes shown in Figure 7-13 to the right should be used. The upper set of holes is there for additional mounting flexibility and can be used if desired.

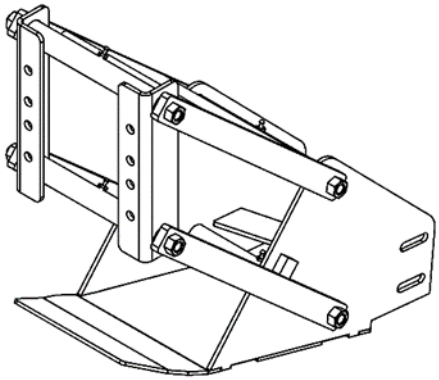


Figure 7-13: Scalper Basket

CAUTION: Never back up or turn defoliator with the scalper bar down. This will result in damaging scalper components.

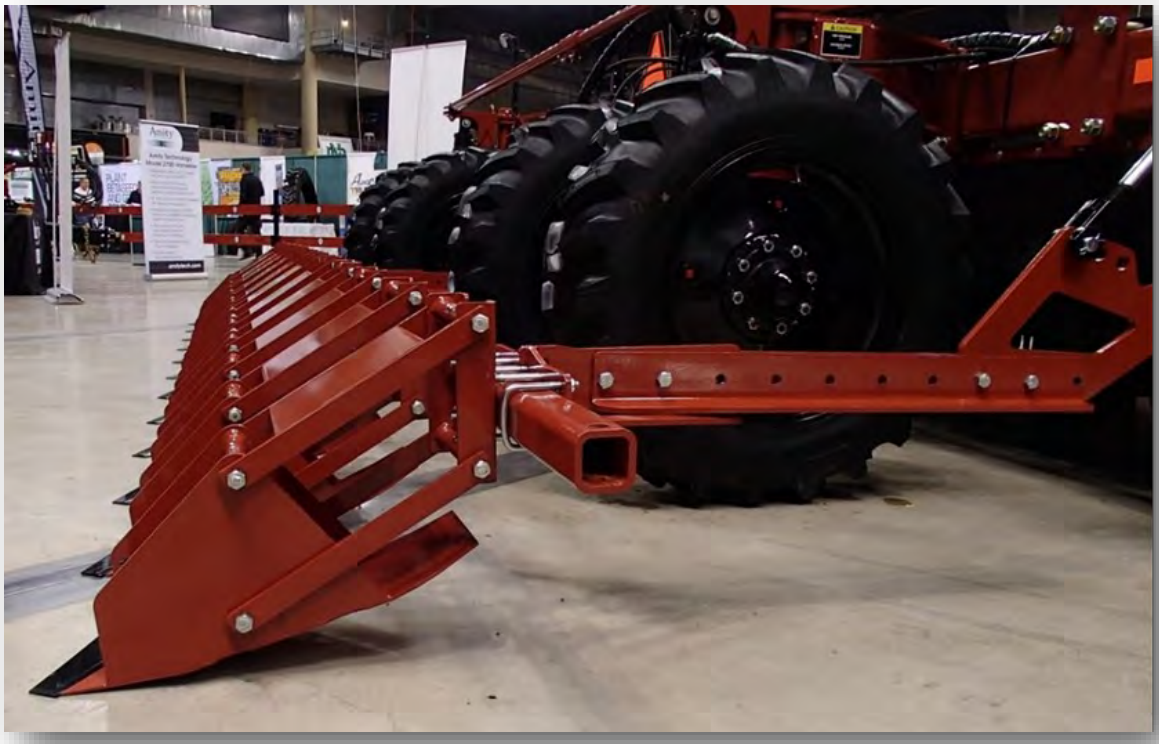


Figure 7-14: Scalper

7.6.1 Knives

Scalper knives should be set so that they remove a slice off the crown on the beet that is 1.5-2 inch (4-5 cm) in diameter. Excess of this amount will result in lower tons per acre yields. Properly setting scalpers is critical in optimizing your defoliation job.

Set up scalper knives as follows:

1. Start with the defoliator at level operating height on a flat and level surface and lower the scalper bar to the ground.
2. Loosen scalper knife bolts so the knife can be moved.
3. A good starting point is with the knives ½ inch (1.2cm) below the trailing edge of the scalper basket. To set this consistently use a ½ inch (1.2 m) shim under the trailing edge of the scalper basket.
4. Adjust the knife so that it is flat on the ground and ½ inch (1.2cm) back from the trailing edge of the basket for a starting point.
5. Tighten scalper knife bolts and move to the next knife.
6. Final adjustments are to be made in field.

Scalper knives field adjustment.

1. With all knives at the initial set point begin defoliating.
2. First set defoliator height so the flails are doing a proper job before setting knives.
3. With defoliator height set, lower scalper to operating position and travel 50 feet (15 m) down the field.
4. Evaluate scalper performance including slice size and angle of cut.
5. Raise or lower scalper knives to increase or decrease amount removed.
6. Angle the scalper knives forwards or backward to achieve a level cut from scalpers.
7. Once set scalpers shouldn't have to be reset, but should be periodically sharpened to maintain a quality cut.
8. Short baskets are available for erratic stands—big beets next to small beets.

7.6.2 Bar height

The Amity scalper bar has two standard mounting positions as shown in the figures below. The bar height should be set to ensure the scalper baskets cannot reach the maximum or minimum stops and instead operate smoothly in the range between them. The scalper bar is set in the central position from factory. Adjust the bar height so it is correct for your conditions according to the diagrams below. Although not typically used the inner cylinder hole may be used to lower the scalper bar further if needed. When the lowest setting is used or the defoliator is not being operated level front to back, the slotted hole on the bar weldment shown below is required to level the scalper bar.

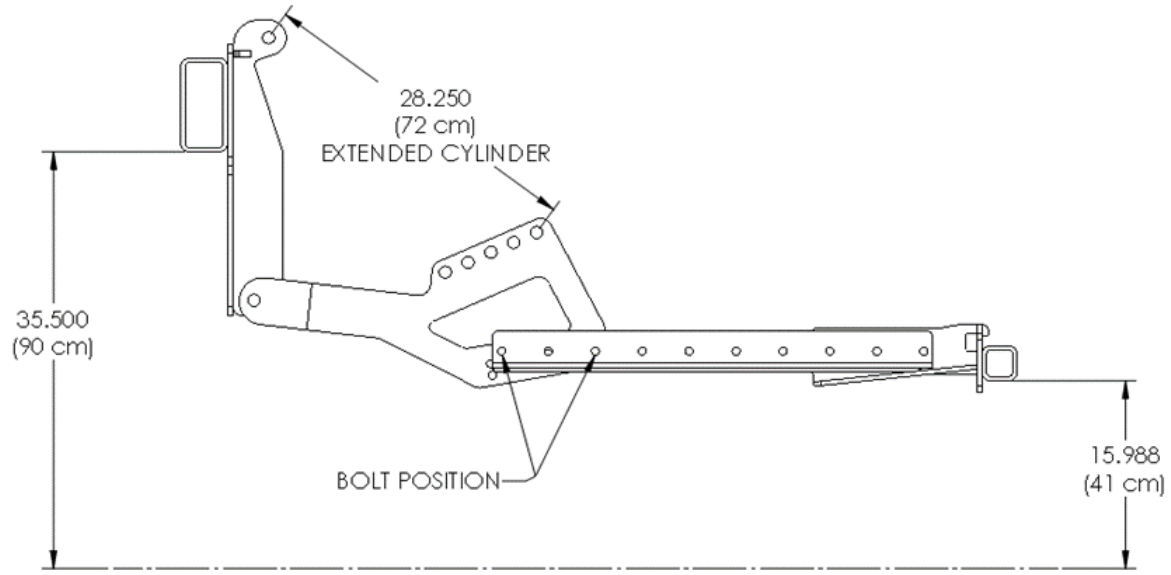


Figure 7-15: Highest Scalper Position—Large beets

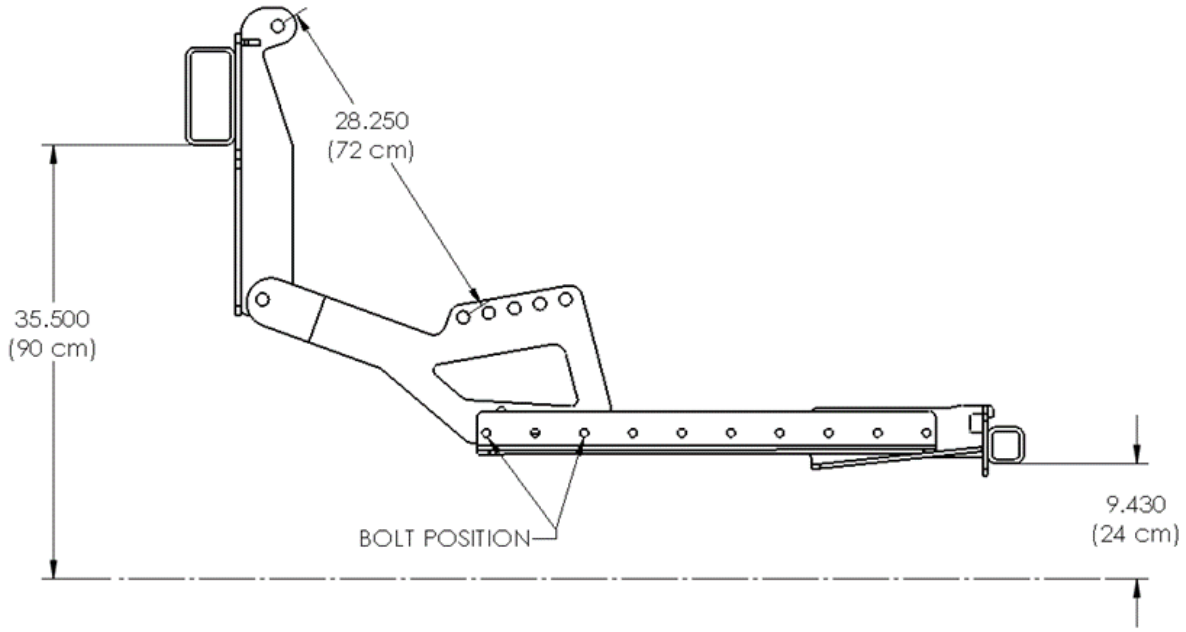


Figure 7-16: Lower Scalper Position—Small beets

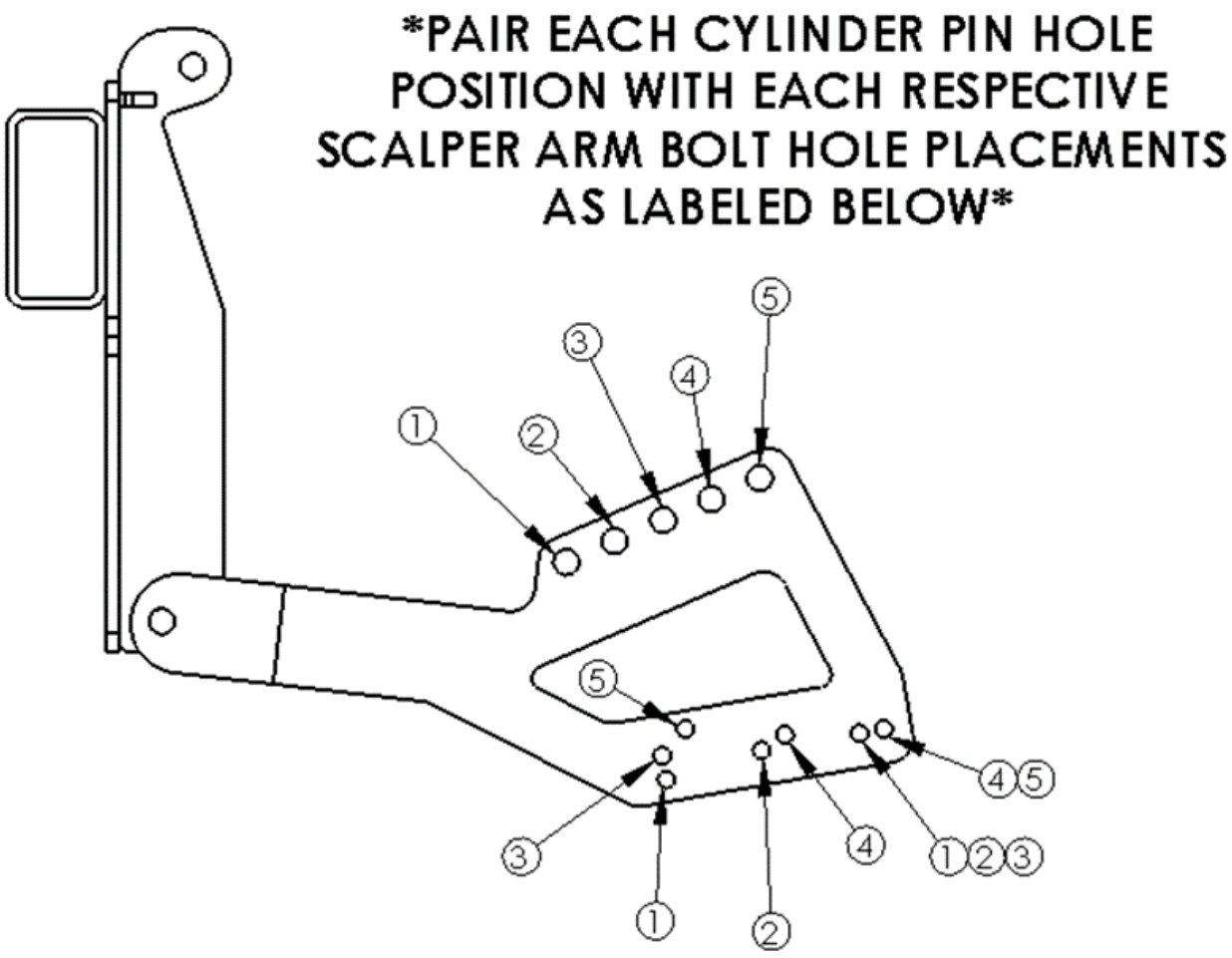


Figure 7-17: Corresponding Bolting Locations to Keep Scalpers Level

8.0 ACTIVE HEIGHT CONTROL

8.1 Introduction

Active Height Control (AHC) is an electric over hydraulic control system that levels and maintains the defoliator at a constant height while defoliating based on a variety of field conditions. Using hydraulic oil supplied from the tractor, a valve bank on the defoliator sends oil to hydraulic cylinders on the hitch and rear struts to raise and lower the defoliator which allows it follow the tops of the beets evenly. To determine what is level with the tops of the beets the defoliator uses two of the scalper baskets or two frame mounted baskets without knifes at the back of the machine that ride on the top of the beets. Using sensors on these baskets, the electronic control unit (ECU) controls the valve bank to level the defoliator.

This system is an ISOBUS (ISO 11783) platform. ISOBUS is an international communication that standardizes communications between tractors and implements. To control this system, the operator will interface with it using any tractor's ISOBUS compatible virtual terminal (VT).

The following are some terminology descriptions that are used in this manual.

- ***Virtual Terminal:***

The virtual terminal or VT is the physical screen that the user will interface with.

- ***Softkeys:***

Softkeys are a set of icons that are used to perform actions on the VT. These icons are usually off to one side of the screen and come in a list form. Different VTs will display different amounts of softkeys at one time and almost all will require the user to page through to access all available icons.

- ***Page:***

A page is larger potion of the screen that displays the information about the system. Different pages will display different information and have different options for the user. For the definition purposes of this manual the VT will display two sections on the screen for use with the AHC system, the page and the softkeys. Figure 8-1 shows an example of the screen. Note, your screen may differ in appearance.

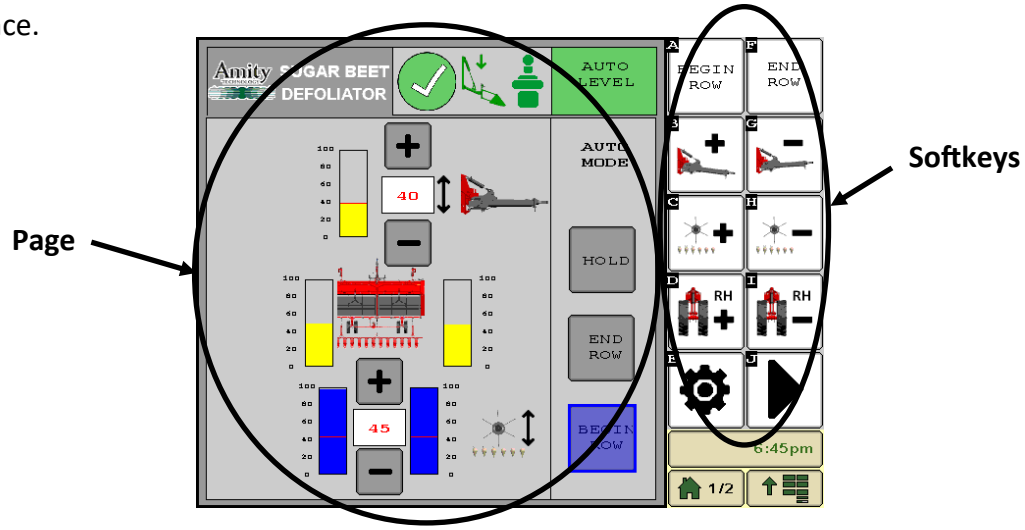


Figure 8-1: Screen Sections

8.2 Safety

As the operator you are responsible for the safe operation and maintenance of the Active Height Control on your Amity sugar beet defoliator. You and anyone else, who will operate, maintain, or work around the defoliator while in use should be familiar with the operation, maintenance, and safety information in this manual.

The most important safety device on this equipment is a safe operator. Any person who has not read and understood all the operation and safety instruction of not only the AHC system but the entire defoliator is not qualified to operate this system.

NOTE!!!!

It is very important to understand that as an automated system they system will move the defoliator with out direct input for the operator. Any time there is hydraulic oil supplied to the defoliator AHC 's valve bank the defoliator has the potential to move.

For the safe operation and maintenance of the AHC system follow these rules:

1. Read and understand this operator manual on how the system works, and what all the controls are and do.
2. Only supply hydraulic oil to the AHC valve when you are ready and intend to use the system. Make sure all persons and objects are outside the danger zone of the defoliator before supplying oil. Shut of the oil supply any time the system will not be in use.
3. Note that anytime oil is supplied to the valve, any control used on the VT may cause the defoliator to move.
4. Be on high alert whenever the system is in AUTO LEVEL state. The defoliator will automatically move based on feedback from the depth wands, not by the operator.
5. Deactivate the joystick anytime it is not in use to prevent any chance of unintentional operation by accidentally bumping it.
6. Before exiting the tractor, turn off the PTO, stop the flow of hydraulic oil to the defoliator, and turn off the tractor.
7. Follow any and all other safety instruction through out the defoliators operators manual.
8. AUTO LEVEL state can not be activated without the PTO running but all other functions will work.

8.3 Softkey Definition

Below are short definitions of all the different softkeys used in the system.

Begin Row:

Enters the system's BEGIN ROW state.

End Row:

Enters the system's END ROW state.

Increase Hitch Target:

Increases the hitch's target height by 1.

Decrease Hitch Target:

Decreases the hitch's target height by 1.

Increase Rear Target:

Increases the rear's target height by 1.

Decrease Rear Target:

Decreases the rear's target height by 1.

Increase Right Strut Target:

Increases the right strut's target height by 1.

Decrease Right Strut Target:

Decreases the right strut's target height by 1.

Increase Left Strut Target:

Increases the left strut's target height by 1.

Decrease Left Strut Target:

Decreases the left strut's target height by 1.

Settings Page:

Opens the settings page.

Home Page:

Opens the main page.

Diagnostic Page:

Opens a diagnostic page.

Active Alarm Page:

Opens a page that will display any and all active alarms.

Basket Calibration:

Calibrates the baskets.

Soft Key Pager:

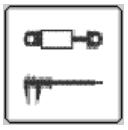
Displays next set of soft keys.

Sound Toggle (On):

Toggles the sound on and off.

Joystick Toggle:

Activates and de-activates the use of the joystick.



Hydraulic Cylinder Calibration:

Opens the cylinder calibration page.

8.4 Main Page

Figure 8-2 and 8-3 shows the main pages of the AHC system. These are the page that display all the necessary information while defoliating. The following are short descriptions of what each part of the page means or represents.

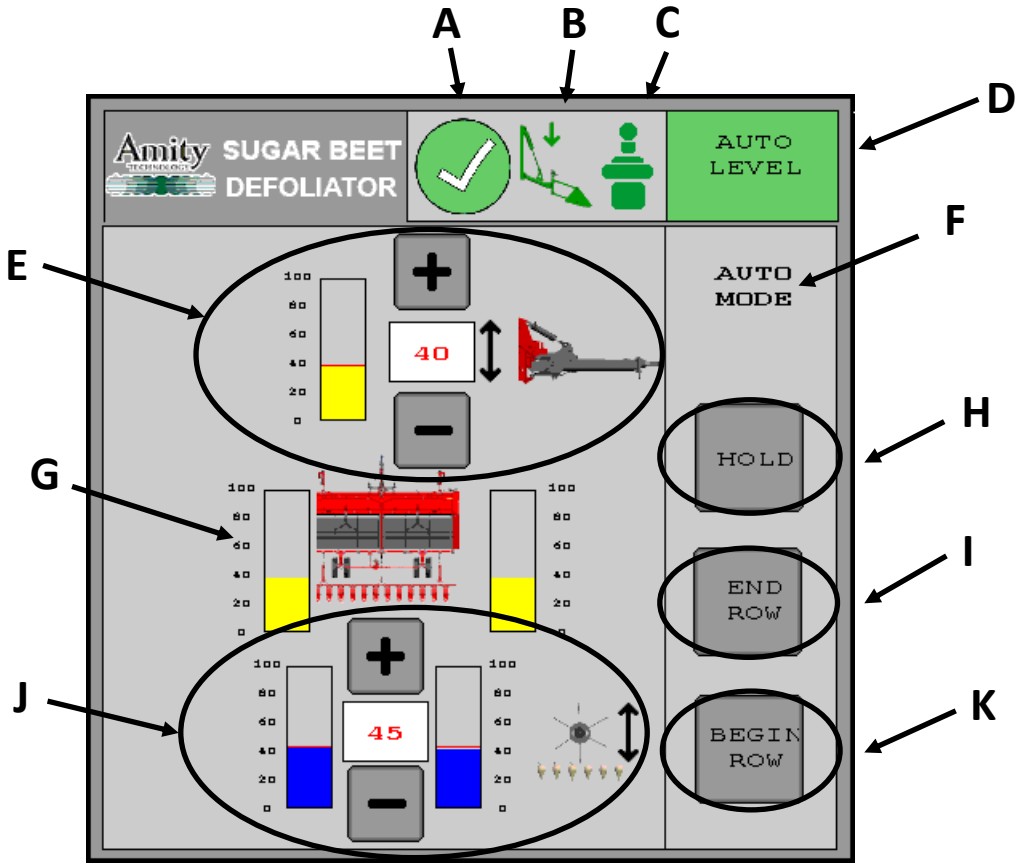


Figure 8-2: Main Page—Auto Mode

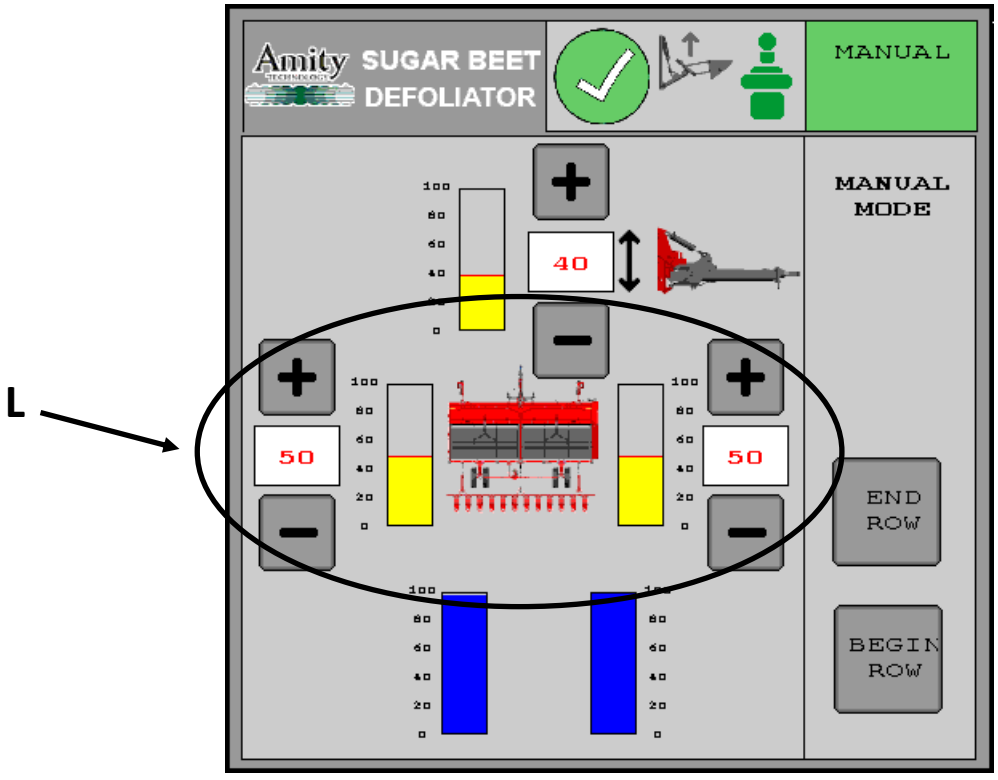


Figure 8-3: Main Page—Manual Mode

A - System Readiness Chart:

The system readiness chart is a pie chart that is made up of three sections that represent criteria that must be met before the system can enter AUTO LEVEL state.

System Calibrated:

The top slice of the pie will be filled in if the baskets have been calibrated.

System Error/Alarm Status:

The right slice of the pie will be filled in if there are no active alarms.

PTO Status:

The left slice of the pie will be filled in if the PTO is running.

System Ready:

Once all the pies are filled in the pie will change to a green circle with a check. This check means that all the requirements for entering into AUTO LEVEL state have been met.

B - Work Switch Status:

The work switch status displays whether the work switch is enabled or disabled. The work switch is a proximity sensor that is use to determine location of the scalper bar or frame mounted baskets. The work switch will only be enabled once the scalper bar or frame mounted baskets are lowered as far as possible, i.e. full cylinder extension. When enabled, the icon on the screen will turn green and have a downward arrow (Figure 8-4). When disabled, the icon will be gray with an upward arrow (Figure 8-5).

Figure 8-4: Enabled Work Switch

Figure 8-5: Disabled Work Switch

C - Joystick Active/Inactive Icon:

In order for the joystick to be used it must first be activated. To activate the joystick there is a softkey to toggle it on and off (Figure 8-6). On the main page in the top right corner there is a Joystick icon that will change colors depending on if it is active. The icon will be gray if the joystick in not active (Figure 8-7). The icon will be green if the joystick is active (Figure 8-8). Touching the joystick icon on the main page will also toggle the joystick status.

Figure 8-6: Toggle on/off Softkey

Figure 8-7: Joystick Inactive Icon

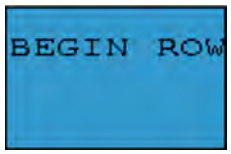
Figure 8-8: Joystick Active Icon

D - System State:

In the upper right Corner of the main page there is a current state box that displays what state (or task) the system is currently in. Below is a description of the states.

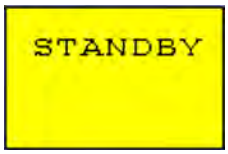
"Blank":

This is the steady state of the system. The system will not preform any action at this time until input is received from the operator. The box will just be empty with no words displayed.



Begin Row:

BEGIN ROW is the state where the hitch will move to it's set point and the rear struts will move to there last position while in AUTO LEVEL. If in manual mode the rear struts will move to there set point set by the user.



Standby:

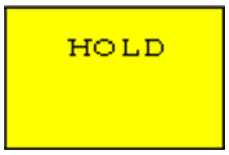
Standby state is the state between BEGIN ROW and AUTO LEVEL. Once the BEGIN ROW state is complete it will transition to STANDBY until both the System Readiness chart is complete (Green Check) and the work switch is enabled. The system will stay in STANDBY until all conditions are met and will not make any movement until then.

Auto Level:

While in AUTO LEVEL state the defoliator will move the rear struts up and down automatically to keep the rear level and the correct height off the top of the beet. Any change to the hitch's set point will also automatically be done while in this state.

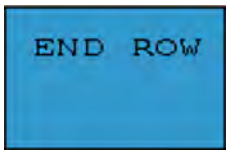
Manual:

While in the MANUAL state the defoliator will move to the hitch, the right strut, and the left strut to their operator defined set points. Any change to the any set point will automatically be done while in this state.



Hold:

While in HOLD state the defoliator will hold it's current position and not make any automatic adjustments.



End Row:

While in END ROW state the defoliator will raise the hitch to 75% of the cylinder stroke and both rear struts to full stroke. The hitch only goes to 75% to protect the PTO if it is still spinning.

E - Hitch Height Set Point and Current Position

Above the picture of the defoliator and next to a picture of the side of a hitch is a yellow bar graph, a box with a number, and a plus and minus above and below. These display the current position and set point of the hitch. The bar graph represents the stroke of the hitch cylinder. 0 represents fully retracted and 100 represents fully extended. The bar graph fills up with yellow to show where the cylinder is at in its' stroke. The number in the box next to the bar graph is the hitch's set point. Enacting a BEGIN ROW will cause the hitch to move to whatever this setting is. This setting ranges from 0 to 100 in increments of 1. A red line on the bar graph corresponds and moves with the set point. Selecting the plus or minus symbols above and below the set point number will change the set point in increments of 1. Selecting the set point box prompts a number pad to type in the desired set point.

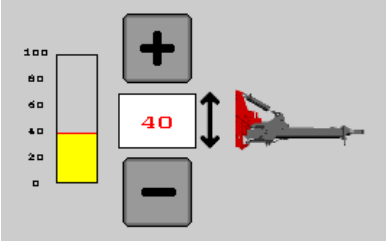


Figure 8-9: Hitch Height

Figure 8-10: Pop Up Key Pad

F - Mode

There are two modes for the rear of the machine that can be used, Auto and Manual. Below the System State box it will show which mode the system is currently in. The users switches Modes in the settings screen with a toggle switch labeled "Rear Height Control".

Figure 8-11: Auto Mode

Figure 8-12: Manual Mode

G - Rear Strut Current Position—Auto Mode

In auto mode, on either side of the picture of the defoliator is a yellow bar graph that displays the rear strut cylinder positions. The bar graph on the left side displays left strut's cylinder position. The bar graph on the right side displays the right strut's cylinder position. 0 represents fully retracted and 100 represents fully extended.

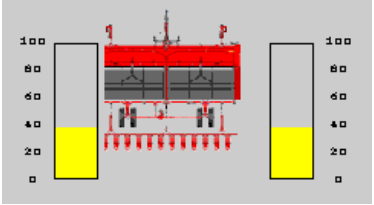


Figure 8-13: Rear Strut Cylinder Positions

H - Hold Button

Selecting the Hold button will toggle the system in and out of the HOLD state. The system must be in AUTO LEVEL state before entering the HOLD state.

Figure 8-14: Hold Button

I - End Row Button

Selecting the End Row button will enter the system into END ROW state.

Figure 8-15: End Row Button

J - Rear Height Set Point and Current Position

Below the picture of the defoliator are two blue bar graphs, a box with a number, and a plus and minus above and below. These display the current positions and set point of the rear height of the defoliator. The bar graphs represent the position of the baskets that ride on the tops of the beets. 100 represents when the baskets are raised off the ground and resting on their stops. 0 represents when the baskets reach their upward limit. The higher the number the higher the machine is off the ground. The bar graph fills up with blue to show where the baskets are within there allowable movement. The bar graph on the left side of the screen corresponds to the basket on the left side of the machine and the bar graph on the right side of the screen corresponds to the basket on the right side of the machine. The number in the box, that is in-between the bar graphs, is the rear height set point. The set point can be set any where between 0 and 100 in increments of 1. A red line in the bar graphs corresponds and moves with the set point. Selecting the plus or minus symbols above and below the set point number will change the set point in increments of 1. Selecting the set point box prompts a number pad to type in the desired set point.

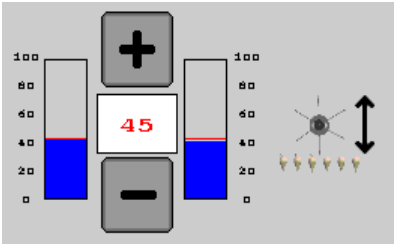


Figure 8-16: Rear Height

Figure 8-17: Pop Up Key Pad

K - Begin Row Button

Selecting the Begin Row button will enter the system into Begin Row state.

Figure 8-18: Begin Row Button

L - Rear Strut Current Position—Manual Mode

In Manual Mode, on either side of the picture of the defoliator is a yellow bar graph that displays the rear strut cylinder positions. The bar graph on the left side displays left strut's cylinder position. The bar graph on the right side displays the right strut's cylinder position. 0 represents fully retracted and 100 represents fully extended. Next to each bar graph is the corresponding cylinder's set point. The setting ranges from 0 to 100 in increments of 1. A red line on the bar graph corresponds and moves with the set point. Selecting the plus or minus symbols above and below the set point number will change the set point in increments of 1. Selecting the set point box prompts a number pad to type in the desired set point.

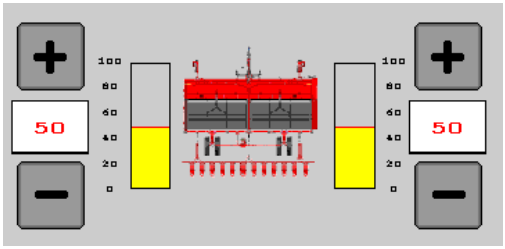


Figure 8-19: Rear Strut Position—Manual Mode

Figure 8-20: Pop Up Key Pad

8.5 Diagnostics Page

Figure 8-21 shows the Diagnostic page, which is a helpful tool if troubleshooting the system is required. This screen shows live data from the ECU that can be used to determine if or where an issue might be. The following are descriptions of each of the items displayed.

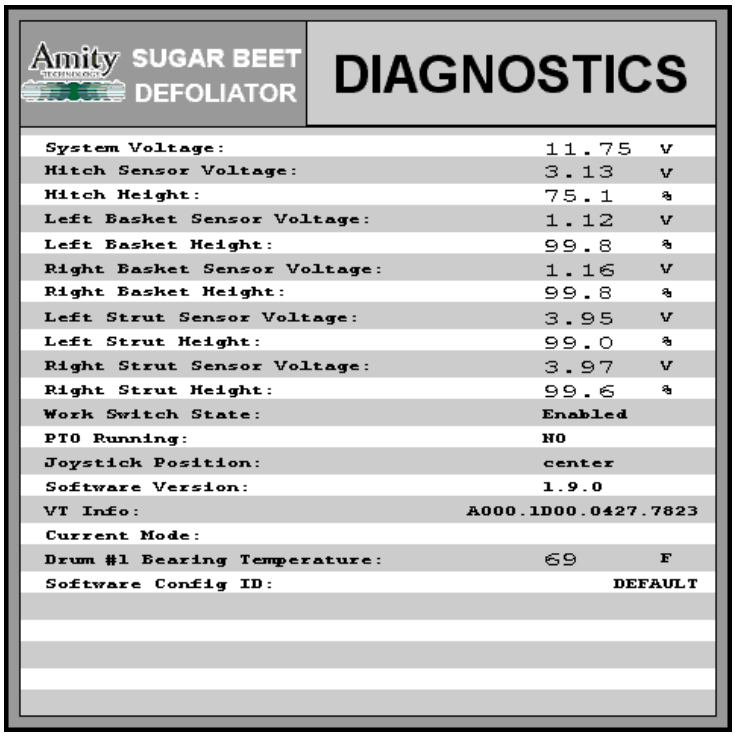


Figure 8-21: Diagnostics Page

- ***System Voltage:***

  The system voltage is the voltage being received from the tractor. This is a 12 volt system.

- ***Hitch Sensor Voltage:***

  The hitch sensor voltage is the reading of the internal sensor in the hitch cylinder on the front of the machine. The voltage should be between 0.5 and 4.5 volts. As the hitch is moved up and down the voltage should move between this range accordingly. The voltage will increase as the cylinder is extended.

- ***Hitch Height:***

  The hitch height is the current stroke distance of the hitch cylinders. The reading should be between 0 and 100% and should match the physical cylinder stroke distance. 100% is the cylinder fully extended.

- ***Left Basket Sensor Voltage:***

  The left basket voltage is the reading of the potentiometer sensor on the left hand basket at the rear of the machine. The voltage must be between 0.5 and 4.5 volts throughout the basket's full travel. As the basket is moved up and down the voltage should move between this range accordingly. The sensor will read towards the 0.5 volt end of the range with the baskets lifted off the ground and resting on there stops.

- ***Left Basket Height:***

The left basket height is the current position of the left basket. The reading should be between 0 and 100% and should match the physical basket position. 100% is with the baskets raised off the ground and against their stops. This height is calibrated so if it reads something other then 100% while against the stops, a calibration will need to be performed.

- ***Right Basket Sensor Voltage:***

The right basket voltage is the reading of the potentiometer sensor on the right hand basket at the rear of the machine. The voltage must be between 0.5 and 4.5 volts throughout the basket's full travel. As the basket is moved up and down the voltage should move between this range accordingly. The sensor will read towards the 0.5 volt end of the range with the basket lifted off the ground and resting on there stops.

- ***Right Basket Height:***

The right basket height is the current position of the right basket. The reading should be between 0 and 100% and should match the physical basket position. 100% is with the baskets raised off the ground and against their stops. This height is calibrated so if it reads something other then 100% while against the stops, a calibration will need to be performed.

- ***Left Strut Sensor Voltage:***

The left strut sensor voltage is the reading of the internal sensor in the left hand strut cylinder at the back of the machine. The voltage should be between 0.5 and 4.5 volts. As the strut is moved up and down the voltage should move between this range accordingly. The voltage will increase as the cylinder is extended.

- ***Left Strut Height:***

The left strut height is the current stroke distance of the left hand strut cylinder. The reading should be between 0 and 100% and should match the physical cylinder stroke distance. 100% represents the cylinder fully extended.

- ***Right Strut Sensor Voltage:***

The right strut sensor voltage is the reading of the internal sensor in the right hand strut cylinder at the back of the machine. The voltage should be between 0.5 and 4.5 volts. As the strut is moved up and down the voltage should move between this range accordingly. The voltage will increase as the cylinder is extended.

- ***Right Strut Height:***

The right strut height is the current stroke distance of the right hand strut cylinder. The reading should be between 0 and 100% and should match the physical cylinder stroke distance. 100% represents the cylinder fully extended.

- ***Work Switch State:***

  The work switch state shows whether or not the work switch is engaged. It is either Enabled or Disabled. The work switch is connected to the scalper bar orframe mounted basket lift cylinder. The work switch becomes enabled when the scalper bar or frame mounted baskets are fully lowered to the ground (cylinders fully extended).

- ***PTO Running:***

  The PTO running is a simple “YES” or “NO” if the PTO is running. This is determined by a sensor at the front of the machine, just after the PTO shaft.

- ***Joystick Position:***

  The joystick position is the current position of the joystick. This will display, “CENTER”, “NORTH”, “EAST”, “SOUTH”, “WEST” based upon which position the joystick is on. “Center” is the natural position of the joystick, straight out. “North” is shown as an arrow on the physical joystick.

- ***Software Version:***

  The software version is the current software version loaded onto the ECU.

- ***VT Info:***

  VT Info, displays info about the physical screen’s hardware and software for troubleshooting and informational purposes.

- ***Current Mode:***

  Current mode displays what state the system is in at that time.

- ***Drum #1 Bearing Temperature:***

  This displays the temperature of the center bearing on the front drum of the machine. Note, if the reading always reads 37°F the sensor may be disconnected or broken.

- ***Software Config ID:***

  This is used for development purposes only. It should always say “Default”.

8.6 Settings Page

Figure 8-22 shows the Setting Page, which displays and allows for changes to some settings for the system.

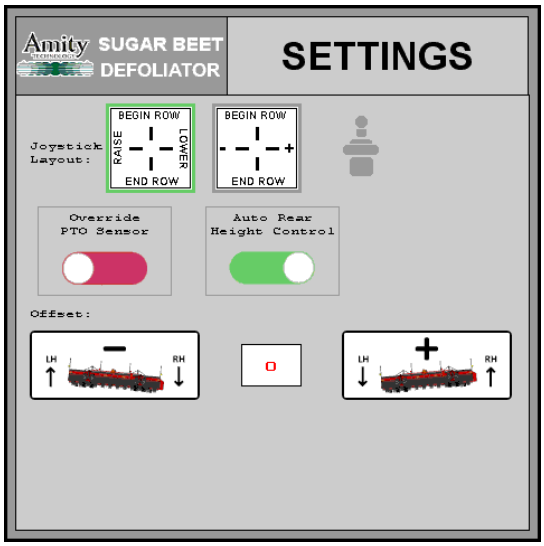


Figure 8-22: Settings Page

- Joystick Layout:

The joystick has 2 different layout options. The joystick can perform 4 different functions by pushing it North, East, South, or West. North is designated by an arrow on the physical joystick and is considered the top function on this screen. To select a configuration select one of the options shown on the screen. The configuration will be boarded in green once selected to show which option is currently being used. The possible functions that the joystick can perform are as follows:

"Begin Row" - Enters the system into BEGIN ROW state.

"END ROW" - Enters the system in to END ROW state.

"+" - Increases the hitch height target for the defoliator. Increases the height in increments of 1.

"-" - Decreases the hitch height target for the defoliator. Decreases the height in increments of 1.

"LOWER" - Lowers the front of the defoliator using the hitch cylinders and enters the system into the Hold state. Multiple joystick commands will continue to lower the front of the defoliator in small increments. This lower function will not change the hitch height target. Once the system exits the Hold state it will go back to the hitch height target set on the main page.

"RAISE" - Raises the front of the defoliator using the hitch cylinders and enters the system into the Hold state. Multiple joystick commands will continue to raise the front of the defoliator in small increments. This raise function will not change the hitch height target. Once the system exits the Hold state it will go back to the hitch height target set on the main page.

In order for the joystick to be used it must be activated first. To active the joystick there is a softkey to toggle between activating and deactivating the joystick .When the joystick is active the icon on the screen will be colored green. When the joystick is inactive the icon will be gray. Changing the configuration will cause the joystick to become inactive until reactivated.

- Override PTO Sensor:

This is used to override the PTO sensor on the defoliator to allow the user to enter AUTO LEVEL with out the PTO shaft spinning. By enabling the PTO override it mimics turning on the PTO on the tractor. This should only be used for diagnostic purposes. You will always want this disabled when defoliating. Red is disabled, green is enabled.

Figure 8-23: PTO Override

- Rear Height Control / Mode

The rear of the machine can be control automatically by feedback from the sensor baskets or manually by the user. To switch between Auto Mode and Manual Mode there is a toggle switch labeled “Auto Rear Height Control”. When the switch is green, Auto Mode is active. When the switch is red, Manual mode is active.

Figure 8-24: AUTO Mode

Figure 8-25: Manual Mode

- Offset:

To make up for manufacturing tolerances the system has an adjustable offset to level the machine. If the baskets are not perfectly level to the frame of the machine, the offset is used to adjust the rear strut cylinder targets to overcome this difference. By setting the offset to anything other then 0, the defoliator will target numbers to tilt the defoliator side to side based on this setting. To change this setting touch the pictures to the left and right of the setting. The left picture will raise the left and lower the right of the machine. The right picture will lower the left and raise the right of the machine. A negative number means the left will be raised higher then the right. A positive number means the right will be raised higher then the left. By selecting the setting itself, a pop up window will appear to manual enter a number.

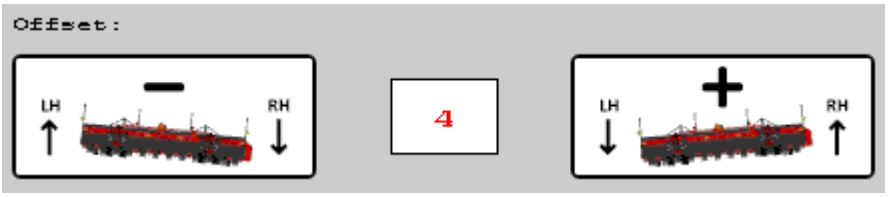


Figure 8-26: Target Depth Setting and Adjustment

- Sound Notifications:

If your VT is compatible with sound there is the option of having the screen beep when entering and exiting AUTO LEVEL STATE. When entering AUTO LEVEL STATE the screen will produce one long beep. When exiting the screen will produce two shorter beeps. While on the settings screen a soft key will appear that allows you to turn this sound on or off. The softkey will change in appearance to signify if the sound is on or off.

Figure 8-27: Sound On

Figure 8-28: Sound Off

- Basket Calibration:

The sensors on the baskets need to be calibrated so that the system knows there starting position. Figure 8-29 shows the softkey that is used to calibrate the baskets. With the baskets raised up in the air so that they are resting on there stops, press the softkey. The system will calibrate its current position to be 100% basket height for both the right and left basket. Upon successful calibration the softkey itself will change to a green check mark for a few seconds. If a orange triangle appears instead it means the sensor voltage is out of range and the physical sensor needs to be looked at. Either the sensor is bad, disconnected, or the mechanical linkage is just adjusted out of range.

Figure 8-29: Basket Calibration Soft Key

Figure 8-30: Successful Calibration

Figure 8-31: Calibration Failed (out of range)

- Cylinder Calibration:

The sensors inside the hydraulic cylinders need to be calibrated. This calibration will be done on a separate page but the softkey to enter this calibration page can only be found on the setting page. See 8.6 for details on the calibration.

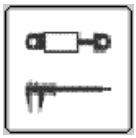


Figure 8-32: Cylinder Calibration Soft Key

8.7 Cylinder Calibration

Figure 8-33 shows the cylinder calibration page. This page is used to calibrate all 3 hydraulic cylinder sensors so that the system knows where the ends of the cylinder stokes are. There are 2 sections to the calibration. The Section 1 is used to calibrate both the right and left rear strut cylinders simultaneously and Section 2 is used to calibrate just the hitch cylinder. For each section there are 2 buttons to preform the calibration. They are used to send oil to the cylinders to move them to full extension and full retraction. For each section it gives you the sensors voltage reading as well was what the system interoperates that voltage reading to be.

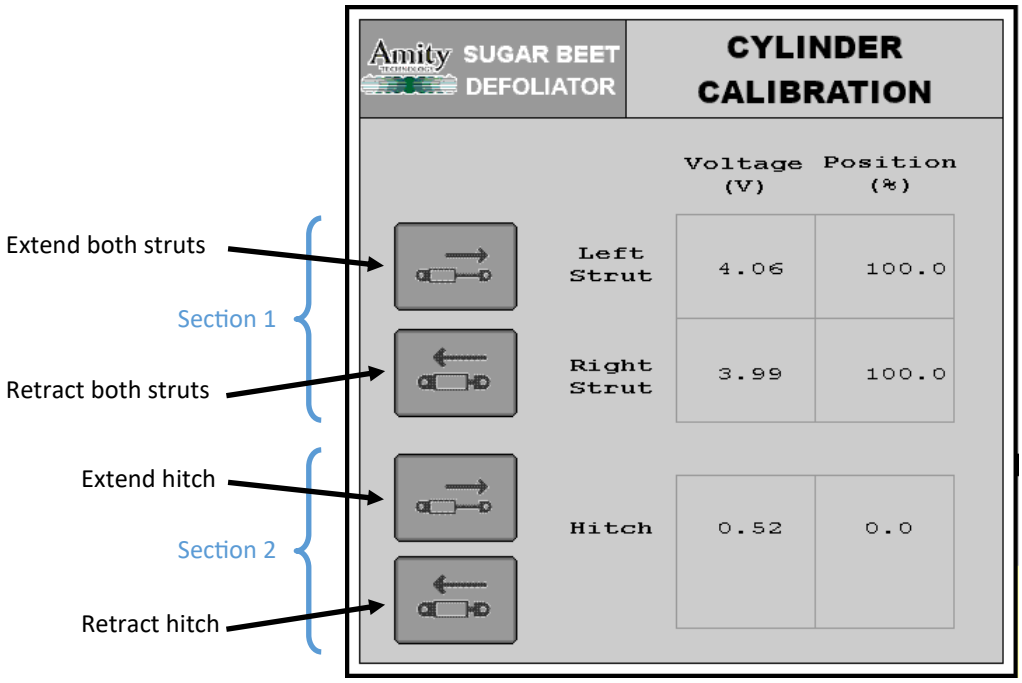


Figure 8-33: Cylinder Calibration Page

Important– During this calibration the machine will move up and down. Be sure all bystanders and objects are clear of the machine before proceeding. Hydraulic oil will need to be supplied to the AHC valve.

To calibrate, **PRESS and HOLD** the extend icon on the left side of the page and it will send oil to extend the cylinder(s). Once the cylinder(s) has reached full extension, release the icon on the screen and it will calibrate the sensor(s) to know that it is currently 100% extended. Then press and hold the retract to calibrate the sensor to know where 0% extension is .The calibration is now complete for that section. Repeat for the other section.

Tip, you can watch the voltage of the sensors and when they stop changing you have reached the end of the cylinder's stroke. We suggest holding for 5 more seconds after the voltage stops changing for good measure.

This cylinder calibration needs to be preformed un initial set up and anytime a part or software is changed.

8.8 Active Alarms Page

Figure 8-34 show the Active Alarms page. This page displays a list of any currently active alarms within the system. AUTO LEVEL state can not be entered while any alarms are active.

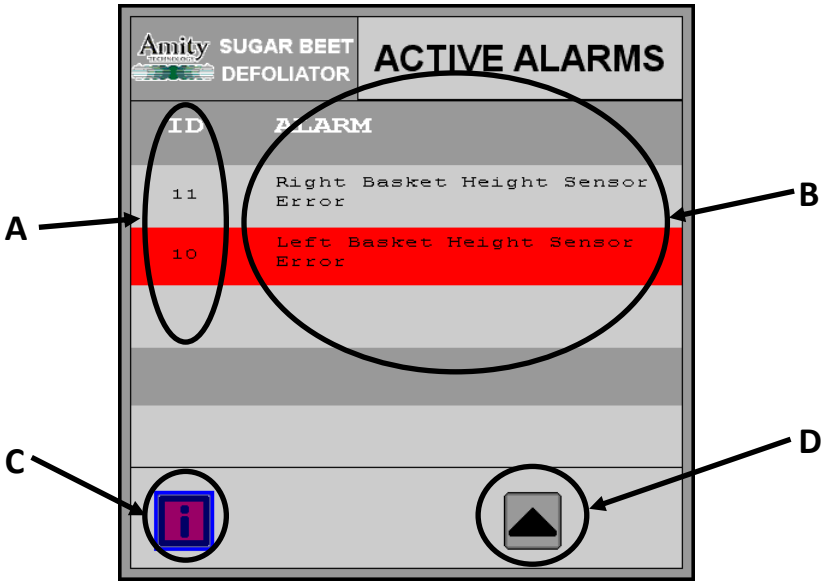


Figure 8-34: Active Alarms Page

- **A**—***Alarm ID:***

Each possible alarm has a specific alarm ID that allows for easy look up in the next couple of pages of this manual.

- **B**—***Alarm Title:***

The alarm title is the name given to the alarm.

- **C**—***Information Icon:***

By selection the Information Icon more information on the highlighted alarm is displayed. This pop up gives a brief description of the alarm and possible causes. Figure 8-35 is an example of this pop up. To return to the list ,select the arrow in the bottom left corner.

Figure 8-35: Alarm Information Pop Up

- **D**—***Scrolling Arrows:***

The scrolling arrows allow you to scroll through the alarm list for selection. The alarm highlighted in red is the alarm that will be selected for more information.

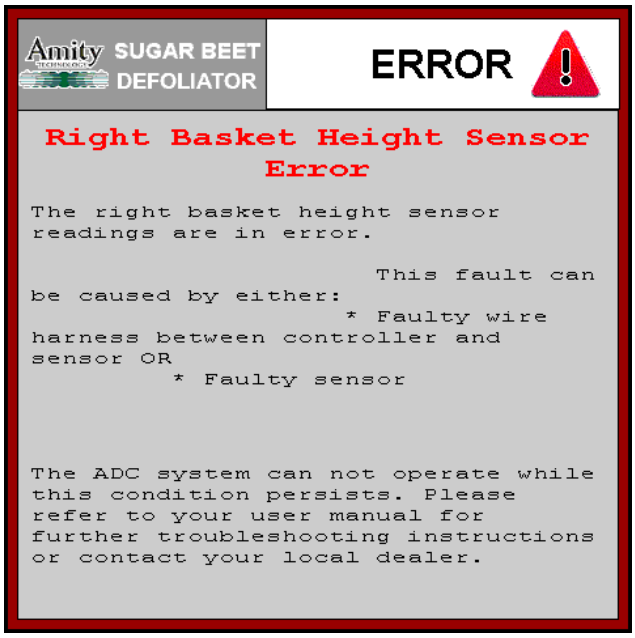


Figure 8-36: Error Pop Up

An alarm will prompt an error message (Figure 8-36) to appear and remain until it is acknowledged. Figure 8-37 is the softkey used to acknowledge the error. The alarm will then be added to the alarm list page. Once the cause of the alarm is addressed the alarm will be removed automatically.

Figure 8-37: Error Acknowledgement Softkey

8.9 Using AHC

Set Up:

To start there are 2 calibrations that need to be done.

☐ ***Cylinder Calibration***—In order for the system to know where the cylinders are at in their stroke a calibration needs to be done to find the ends of the cylinder. This calibration will be done on a stand alone page that can be accessed through the setting page. This calibration really one needs to be done once on initial set up and after any change in parts or software. See section 8.6 for more details.

☐ ***Basket Calibration***— Same as with the cylinders the system needs to be calibrated for the sensors on the baskets. In this case we will only be calibrating the top end. To complete the calibration the baskets need to be raised up off the ground so that their parallel arms are resting again their stops. Once the baskets are on there stops simple press the basket calibration softkey on the setting page and it will calibrate the baskets current position to be 100%. The softkey will change to a green check mark for a few seconds upon successful calibration. See section 8.5 for more details.

There are a few items that should be set up before defoliating. Upon initial set up, start high and work your way down to find the correct setting. Setting will change based on field conditions, beet variety, etc.

☐ ***Hitch Height Set Point*** – This is the height of the front of the defoliator while defoliating.

☐ ***Rear Height Set Point*** *(Auto Mode Only)* – This is the height of the rear of the defoliator while defoliating. While in auto leveling the defoliator will automatically adjust to accomplish this height.

☐ ***Left Strut Set Point*** *(Manual Mode Only)* – This is the cylinder stroke position for the left hand rear strut. When a begin row is activated the strut moves to this set point and stay there until adjusted or an end row is preformed.

☐ ***Right Strut Set Point*** *(Manual Mode Only)* – This is the cylinder stroke position for the right hand rear strut. When a begin row is activated the strut moves to this set point and stay there until adjusted or an end row is preformed.

☐ ***Joystick Configuration and On/OFF***— To use the joystick while defoliating, pick which joystick configuration to use from the setting page. The joystick will then have to be enabled before using the joystick toggle softkey.

☐ **Offset**— If the defoliator baskets are not level with the frame of the defoliator due to manufacturing tolerances an offset can be used to compensate.

Defoliating:

Once the system is calibrated, set up, and alarm free you are ready to defoliate. To defoliate follow these steps:

1. Ensure the machine is clear of any objects and any bystanders are at a safe distance.
2. Supply hydraulic oil to the AHC valve.
3. Engage PTO. The System Readiness Chart will turn into a **green** check mark indicating the system is ready to enter AUTO LEVEL state.
4. Enter the row of sugar beets and select "BEGIN ROW" using the screen or joystick. The Current Mode Box will change to **yellow** and read "STAND BY" to indicate that the defoliator has reached its initial target points.
5. Once the baskets are over the tops of beets lower them to engage the work switch.
6. Once the work switch is engaged the Current Mode Box will turn green and read "AUTO LEVEL" and will now start to automatically adjust the rear cylinders until the machine reaches its' rear target.
7. Use the "HOLD" function to temporarily pause the automatic adjustments if needed.
8. At the end of the row, select "END ROW" using the screen or joystick to lift the machine off the tops of the beets. The Current Mode Box will change to **blue** and read "END ROW" until fully raised.
9. Raise the scalper bar or frame mounted baskets for turning around at the end of the field.

8.10 Alarm Information

The following is a list and descriptions of the possible errors for the system.

Alarm ID Number	Title	Info	Possible Solution
1	Hitch Solenoid Overcurrent Fault	Too high an output current has been detected on the controller output driving the hitch solenoid. This fault can be caused by either: • Faulty wire harness between controller and solenoid OR • Faulty solenoid	-Check wiring harness, harness connectors, and solenoid for damage. Replace any damaged parts. -Swap the raise and lower coils on the solenoid to determine if the problem follows a certain coil. -Supplying the coils with 12 volts from a stand alone system will cause the solenoid to open one way or another. If the solenoid doesn't open, the coil is bad or the spool could be blocked.
2	Left Strut Solenoid Overcurrent Fault	Too high an output current has been detected on the controller output driving the left strut solenoid. This fault can be caused by either: • Faulty wire harness between controller and solenoid OR • Faulty solenoid	-Check wiring harness, harness connectors, and solenoid for damage. Replace any damaged parts. -Swap the raise and lower coils on the solenoid to determine if the problem follows a certain coil. -Supplying the coils with 12 volts from a stand alone system will cause the solenoid to open one way or another. If the solenoid doesn't open the coil is bad or the spool could be blocked.
3	Right Strut Solenoid Overcurrent Fault	Too high an output current has been detected on the controller output driving the right strut solenoid. This fault can be caused by either: • Faulty wire harness between controller and solenoid OR • Faulty solenoid	-Check wiring harness, harness connectors, and solenoid for damage. Replace any damaged parts. -Swap the raise and lower coils on the solenoid to determine if the problem follows a certain coil. -Supplying the coils with 12volts from a stand alone system will cause the solenoid to open one way or another. If the solenoid doesn't open the coil is bad or the spool could be blocked.

4	Hitch Solenoid Open Fault	Too low an output current has been detected on the controller output driving the hitch solenoids. This fault can be caused by either: • Faulty wire harness between controller and solenoid OR • Faulty solenoid	-Check wiring harness, harness connectors, and solenoid for damage. Replace any damaged parts. -Swap the raise and lower coils on the solenoid to determine if the problem follows a certain coil. -Supplying the coils with 12 volts from a stand alone system will cause the solenoid to open one way or another. If the solenoid doesn't open the coil is bad or the spool could be blocked.
5	Left Strut Solenoid Open Fault	Too low an output current has been detected on the controller output driving the left strut solenoid. This fault can be caused by either: • Faulty wire harness between controller and solenoid OR • Faulty solenoid	-Check wiring harness, harness connectors, and solenoid for damage. Replace any damaged parts. -Swap the raise and lower coils on the solenoid to determine if the problem follows a certain coil. -Supplying the coils with 12 volts from a stand alone system will cause the solenoid to open one way or another. If the solenoid doesn't open the coil is bad or the spool could be blocked.
6	Right Strut Solenoid Open Fault	Too low an output current has been detected on the controller output driving the right strut solenoid. This fault can be caused by either: • Faulty wire harness between controller and solenoid OR • Faulty solenoid	-Check wiring harness, harness connectors, and solenoid for damage. Replace any damaged parts. -Swap the raise and lower coils on the solenoid to determine if the problem follows a certain coil. -Supplying the coils with 12 volts from a stand alone system will cause the solenoid to open one way or another. If the solenoid doesn't open the coil is bad or the spool could be blocked.
7	Hitch Movement Timeout Fault	The AHC system is experiencing problems moving the hitch at an adequate speed. This fault can be caused by either: • Faulty wire harness between controller and solenoid OR • Faulty solenoid OR • Faulty cylinder OR • Hydraulic problems OR • The cylinder has reached the end of its stroke and can't move any further	-Check to make sure the SCV is suppling oil to the AHC valve -Check wiring harness, harness connectors, and solenoid for damage. Replace any damaged parts -Check for any obstructions -Check for power at the solenoid -Calibrate the cylinders

8	Left Strut Movement Timeout Fault	The AHC system is experiencing problems moving the left strut at an adequate speed. This fault can be caused by either: • Faulty wire harness between controller and solenoid OR • Faulty solenoid OR • Faulty cylinder OR • Hydraulic problems OR • The cylinder has reached the end of its stroke and can't move any further	-Check to make sure the SCV is suppling oil to the AHC valve -Check wiring harness, harness connectors, and solenoid for damage. Replace any damaged parts -Check for any obstructions -Check for power at the solenoid -Calibrate the cylinders
9	Right Strut Movement Timeout Fault	The AHC system is experiencing problems moving the right strut at an adequate speed. This fault can be caused by either: • Faulty wire harness between controller and solenoid OR • Faulty solenoid OR • Faulty cylinder OR • Hydraulic problems OR • The cylinder has reached the end of its stroke and can't move any further	-Check to make sure the SCV is suppling oil to the AHC valve -Check wiring harness, harness connectors, and solenoid for damage. Replace any damaged parts -Check for any obstructions -Check for power at the solenoid -Calibrate the cylinders
10	Left Basket Height Sensor Error	The left basket height sensor readings are in error. This fault can be caused by either: • Faulty wire harness between controller and sensor OR • Faulty sensor	-Check for disconnected or loose connection on the electrical connector -Check wiring harness, harness connectors, the sensor, and controller for damage. Replace any damaged parts -Check for power being supplied to the sensors. Must be around 5 volts -Check for a signal volts from the sensor. Must be between 0.5 and 4.5 volts through out its fully range of movement

11	Right Basket Height Sensor Error	The right basket height sensor readings are in error. This fault can be caused by either: • Faulty wire harness between controller and sensor OR • Faulty sensor	-Check for disconnected or loose connection on the electrical connector -Check wiring harness, harness connectors, the sensor, and controller for damage. Replace any damaged parts -Check for power being supplied to the sensors. Must be around 5 volts -Check for a signal volts from the sensor. Must be between 0.5 and 4.5 volts through out its fully range of movement
12	Left Strut Cylinder Position Sensor Error	The left strut cylinder position sensor readings are in error. This fault can be caused by either: • Faulty wire harness between controller and cylinder OR • Faulty cylinder	-Check for disconnected or loose connection on the electrical connector -Check wiring harness, harness connectors, the sensor, and controller for damage. Replace any damaged parts -Check for power being supplied to the sensors. Must be around 12 volts -Check for a signal volts from the sensor. Must be between 0.5 and 4.5 volts through out its fully range of movement
13	Right Strut Cylinder Position Sensor Error	The right strut cylinder position sensor readings are in error. This fault can be caused by either: • Faulty wire harness between controller and cylinder OR • Faulty cylinder	-Check for disconnected or loose connection on the electrical connector -Check wiring harness, harness connectors, the sensor, and controller for damage. Replace any damaged parts -Check for power being supplied to the sensors. Must be around 12 volts -Check for a signal volts from the sensor. Must be between 0.5 and 4.5 volts through out its fully range of movement

14	Hitch Cylinder Position Sensor Error	The hitch cylinder position sensor readings are in error. This fault can be caused by either: • Faulty wire harness between controller and cylinder OR • Faulty cylinder	-Check for disconnected or loose connection on the electrical connector -Check wiring harness, harness connectors, the sensor, and controller for damage. Replace any damaged parts -Check for power being supplied to the sensors. Must be around 12 volts -Check for a signal volts from the sensor. Must be between 0.5 and 4.5 volts through out its fully range of movement
N/A	Drum #1 Bearing Temperature Threshold Error	Drum #1 Bearing Temperature is reading a temperature higher than expected	-The center bearing has gotten too hot. Makes sure it is greased. Replace if damaged.

9.0 TRANSPORTATION

9.1 Warning Lights

CAUTION: Prevent collisions between other road users, slow moving tractors with attachments or towed equipment, and self-propelled machines on public roads. Frequently check for traffic from the rear, especially in turns, and use turn signal lights or hand signals.

Use headlights, flashing warning lights, and turn signals day and night. Follow local regulations for equipment and marking. Keep lighting and marking visible and in good working order. Replace or repair lighting and marking that has been damaged or lost.

9.2 Preparing for Transport

1. Turn off PTO and any constant hydraulics for transport.
2. Clean all soil and debris off the machine.
3. Raise the front hitch to the highest position for maximum ground clearance.
4. Lower the rear struts against the stops. If drum #3 flails are too close to the ground, add an additional stop for transport.
5. Make sure all safety decals and lights are clean and visible and all tail lights and turn signals function properly.

CAUTION: Always use warning lights when transporting. Braking distance is greatly increased when towing a defoliator.

NOTE: See section 3.1 for maximum transport speeds.

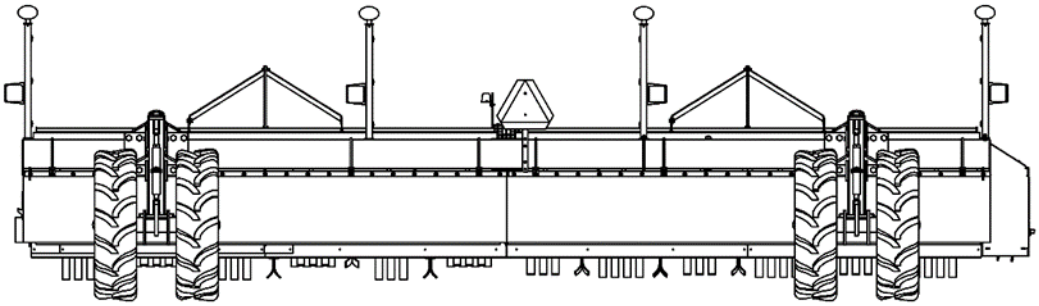


Figure 9-1: Rear Defoliator

10.0 CLEANING

Cleaning is an important part of defoliator maintenance. This section illustrates a few locations where mud will routinely build up and need to be cleaned.

10.1 Row Finder

Row finder wands (A) and springs (B) must be cleaned routinely in order for the row finder to correctly locate beets.

Also, clean the area around the hydraulic valve spool and all other moving components to prevent seal failure.

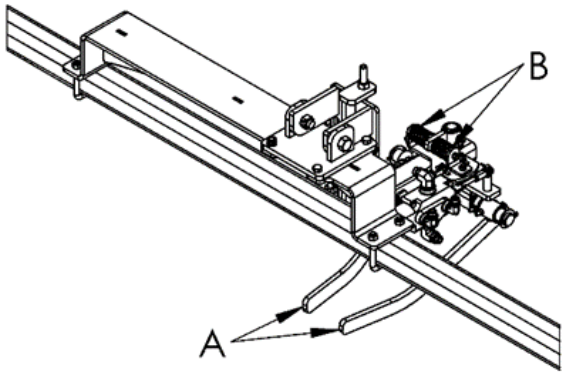


Figure 10-1: Row Finder Cleaning

10.2 Scalpers

Scalpers can plug with mud and leaves between the knife and basket. Keeping scalper knives sharp and properly setting knives can help alleviate plugging along with lifting the scalper bar slightly before beets end at headlands so they are not pulled through the dirt.

Despite good cleaning practices, scalpers will plug occasionally and will need to be cleared at the field end if they do not unplug themselves. Clean as needed.

Figure 10-2: Scalper Cleaning

10.3 Top Doors & Interior Walls

Mud under top doors and on interior walls is the largest place for buildup on the defoliator. Allowing mud to build too far will cause premature wear of flails and needs to be cleaned regularly to prevent this. Inspect and clean your Amity defoliator every two hours. Cleaning can be required more or less often depending on field conditions and it is up to the operator to make the final determination.

NOTE: use caution when cleaning tarp top doors.

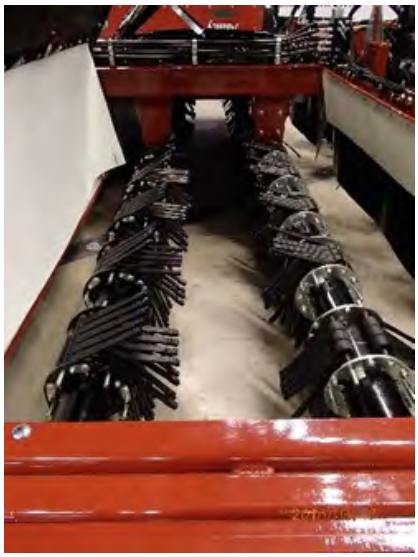


Figure 10-3: Interior Cleaning

10.4 Gearbox Enclosure

The gearbox enclosure should be cleared of dirt and debris whenever driveline maintenance or inspection is performed. This will keep material clear of driveline seals and gearbox breather vents prolonging component life.

Figure 10-4: Gearbox Enclosure

11.0 STORAGE

11.1 End of Season

1. Thoroughly clean the defoliator inside and out. Debris and dirt will draw moisture and cause rust.
2. Inspect the defoliator for any damaged or worn components; repair or replace as needed.
3. Lubricate all grease fittings and run machine for five minutes to distribute lubricant.
4. Touch up paint on all parts from which paint has been worn to prevent rusting.
5. Move the defoliator to a level, dry, and clean area.
6. Put blocking material under the front support stands to prevent sinking and under the rear struts to take load off the tires.
7. Use dielectric grease for M12 connection points.

11.2 Beginning of Season

1. Attach the defoliator to the tractor (see section 5.0).
2. Remove all support blocks from the front support stands and rear struts.
3. Lubricate the entire machine (see section 11.0, Lubrication and Maintenance). This will force any collected moisture out of the bearings. Replace the gearbox oil (see section 11.0, Lubrication and Maintenance).
4. Run the defoliator to ensure proper function.
5. Tighten any loose components, including guards and shields.
6. Review the operator's manual prior to operation.

IMPORTANT: All components that are damaged or worn must be repaired or replaced before operating the defoliator. (See parts book for part numbers.)

12.0 LUBRICATION AND MAINTENANCE

12.1 General Maintenance Information

Perform each lubrication and service illustrated in this section at the beginning and end of each season.

IMPORTANT: The period for recommended lubrication and maintenance is based on normal conditions. Severe or unusual conditions may require more frequent lubrication or oil changes.

IMPORTANT: The items listed separately from the lubrication chart and the servicing interval pages are of extra importance. These items must be well maintained and checked routinely to maximize their lifespan.

12.1.1 Grease:

Clean grease fittings before using a grease gun to prevent injecting contaminates. Replace any lost or broken fittings immediately. If a new fitting fails to take grease, remove it and check for failure of adjoining parts.

SAE multipurpose high temperature extreme pressure (EP) grease with less than 1% molybdenum disulfide grease should be used for most grease points, NLGI #2 lithium base is recommended.

Moly Grease EP - 3% molybdenum disulfide NLGI #2 is specified strictly for drive couplers to extend component wear life.

12.2 U Joints

IMPORTANT: On needle bearings (A), use of grease with more than 1% molybdenum disulfide content may lead to premature U joint failure.

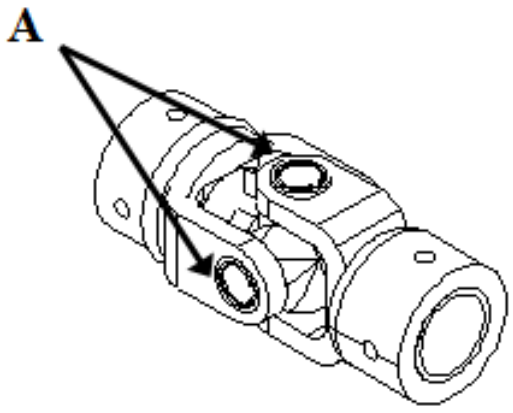


Figure 12-1: Needle Bearings

12.3 Gearbox Oil Level

Gearbox oil levels should be checked routinely and filled to line (A) shown in Figure 11-2.

Side plugs (B) can be found on all gearboxes and the lower side plug is used to measure the correct fill level.

When gearboxes are filled with the proper amount of oil, the level should be just below the threads of side plug (A). Excess oil can be drained from the gearbox using side plug (B).

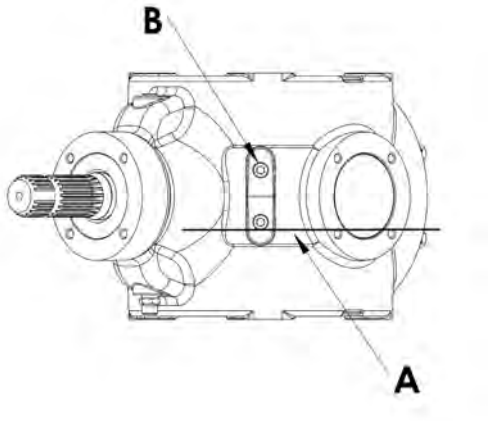


Figure 12-2: Gearbox Oil Level

Under filling the gearbox will cause a buildup of heat which when it reaches a critical level will cause seal failure which will cause gearbox failure.

12.4 Changing Gearbox Oil

Gearbox Oil service interval is every 250 hours or annually. Although the oil will not break down in this time period dust, dirt and moisture can enter through the breather when the oil warms and cools during operation. These contaminants must be removed on a regular basis to ensure long life for working components. Access holes are located underneath the drain plug on all gearboxes allowing oil to be changed without removing the gearboxes from the defoliator frame. To change the oil:

1. Before beginning to change oil it is important to clean around the fill (breather), level, and drain ports to prevent contamination.
2. Place an oil catch pan under each gearbox remove the drain, level and fill (breather) plugs. While breather is out clean following section 11.5 Breather Cleaning.
3. Allow each gearbox to drain for 10 minutes
4. Install the drain plugs and dispose of used oil in an approved manner.
5. Fill with SAE 80W90 EP (extreme pressure) until oil just starts to seep out of the lower oil level plug. Refer to Table 8 for approximate fill quantities.
6. Install the level and fill plug.

12.5 Breather Cleaning

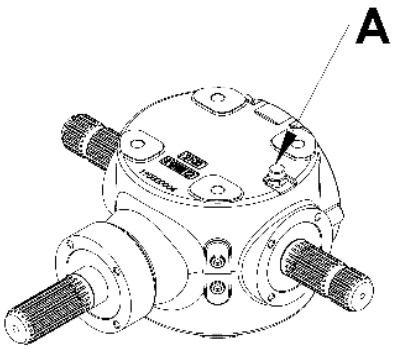


Figure 12-3: Gearbox Breather

The breather must be able to vent atmospheric conditions during heating and cooling cycles of operation. If it cannot vent, oil will seep out seals and run low. Prolonged operation with low oil levels will damage the internal components. To clean the breather:

1. Clean Gearbox surface around breather to prevent contamination.
2. Remove breather (A), shown in figure 46.
3. Stop up the breather opening using a plastic plug or a clean rag to prevent contaminants from entering the gearbox.
4. Soak the breather in solvent for one hour.
5. Use a pointed instrument or wire to remove any residue from breather passages.
6. Blow out the breather with high pressure air.
7. Blow through the breather to ensure the passages are clear.
8. Reinstall and tighten breather (A) in the gearbox.

12.6 Gearbox Torque

Check all gearbox hardware when performing yearly maintenance if hardware is loose remove and reinstall with new hardware torque to the appropriate spec listing in Table 11-1.

If gearbox is replaced, in a star pattern torque the hardware to roughly half the torque spec, then fully tighten to torque spec using Loctite 243 or equivalent.

Table 12-1: Gearbox Capacity and Torque

Gearbox Series	Approx. Oil Capacity*	Fastener	Torque Spec.**
2100	57 oz / 1.69 Liters	5/8" grade 5 Hex Bolt	170 lb-ft(231 N-m)
2125	95 oz / 2.81 Liters	M16 class 8.8 Hex Bolt	183 lb-ft(248 N-m)
		M16 class 10.9 Flange Bolt	253 lb-ft(343 N-m)
2155	135 oz / 4 Liters	M20 class 8.8 Hex Bolt	325 lb-ft(441 N-m)

*Oil capacity varies with gearset installed final, oil level should be filled to lower oil level plug.
**All fasteners should be installed with Loctite 243 and torqued to spec. do not retighten after installing.

12.7 Flails

The position and condition of the rotation flails is crucial to the quality of the defoliator job done by the machine. The flails must be positioned exactly over the rows to optimally clean the foliage and tailing from the beets. All flails must be in good condition. Any missing flails could affect the balance of the rotor and lead to severe vibration.

12.7.1 Steel Flails:

Row spacing: Steel flails row spacing is not adjustable. If row spacing must be changed a genuine pre-balanced replacement drum(s) is available for your Amity defoliator. Please see your parts manual for the appropriate part number(s).

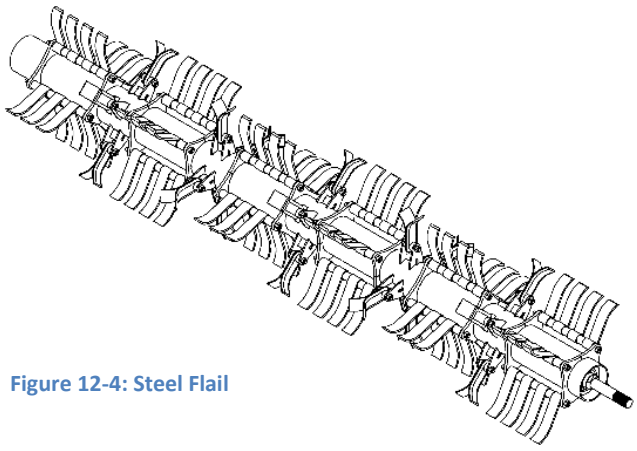


Figure 12-4: Steel Flail

Flail replacement:

1. Open defoliator top doors for access to flails
2. Inspect all flail and determine which ones need to be replaced.
3. Cup – Remove flail rod bolt, L-Knife – Remove mounting bolt
4. Remove flail tube with flails and spacers.
5. Inspect and replace missing or damaged components using only genuine Amity parts. Refer to the parts manual for the appropriate part numbers.
6. Reinstall flail rod/bolt through flail tube with flails and spacers preassembled.
7. Tighten flail rod/bolt.
8. Close doors and run machine up to operating speed to check drum balance. If unbalanced, ensure flails opposite of replaced components are also new. If still unbalanced, tubes may need to be removed and rebalanced.

NOTE: When individual steel flails are replaced the flails on the opposite side should also be replaced to maintain the drum balance.

NOTE: Steel drums on defoliators rotate at approximately 1045 RPMs; if all new flails are installed on the drum it should be balanced to prevent excess vibration.

12.7.2 Rubber Flails:.

Row Spacing: Normally row spacing is set once from the factory and will not need to be changed unless the customer changes crop spacing. To set spacing:

1. Open defoliator top doors for access to flails.
2. Determine the required flail position by measuring from the center of the machine.
3. Mark the center position required for each flail basket.
4. Loosen the flail basket bolts clamping the rings onto the drum.
5. Slide the assemblies to the desired position on the drum.
6. Retighten flail ring bolts securing the basket to the drum.

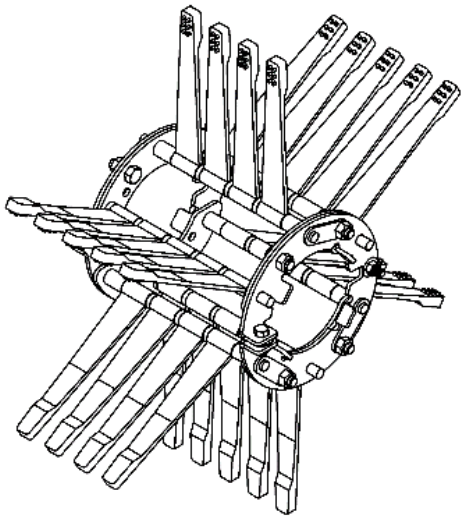


Figure 12-5: Rubber Flail

Flail Replacement:

1. Open defoliator top doors for access to flails.
2. Inspect all flails and determine which ones need to be replaced.
3. Remove flail rod mounting bolt.
4. Remove flail rod.
5. Replace missing or damaged flails using only genuine Amity parts. Refer to the parts manual for the appropriate part numbers.
6. Reinstall hinge rod threading on spacers and flails in the appropriate sequence.
7. Tighten flail rod mounting bolt.

NOTE: When replacing all the rubber flails, use a soap and water solution to lubricate flail mounting hole making it easier to slide the new flails onto the flail rod.

NOTE: Rubber flail drums on the Amity defoliators rotate at approximately 400 RPMs are not balanced from the factory and do not require to be rebalanced when flails are replaced.

12.8 Servicing Intervals

Before 1st Use:

1. Grease hitch, row finder, scalper baskets, U joints, and PTO driveline.
2. Check all gearbox oil levels.

2 Hours:

1. Inspect Defoliator and clean mud if necessary.

12 Hours:

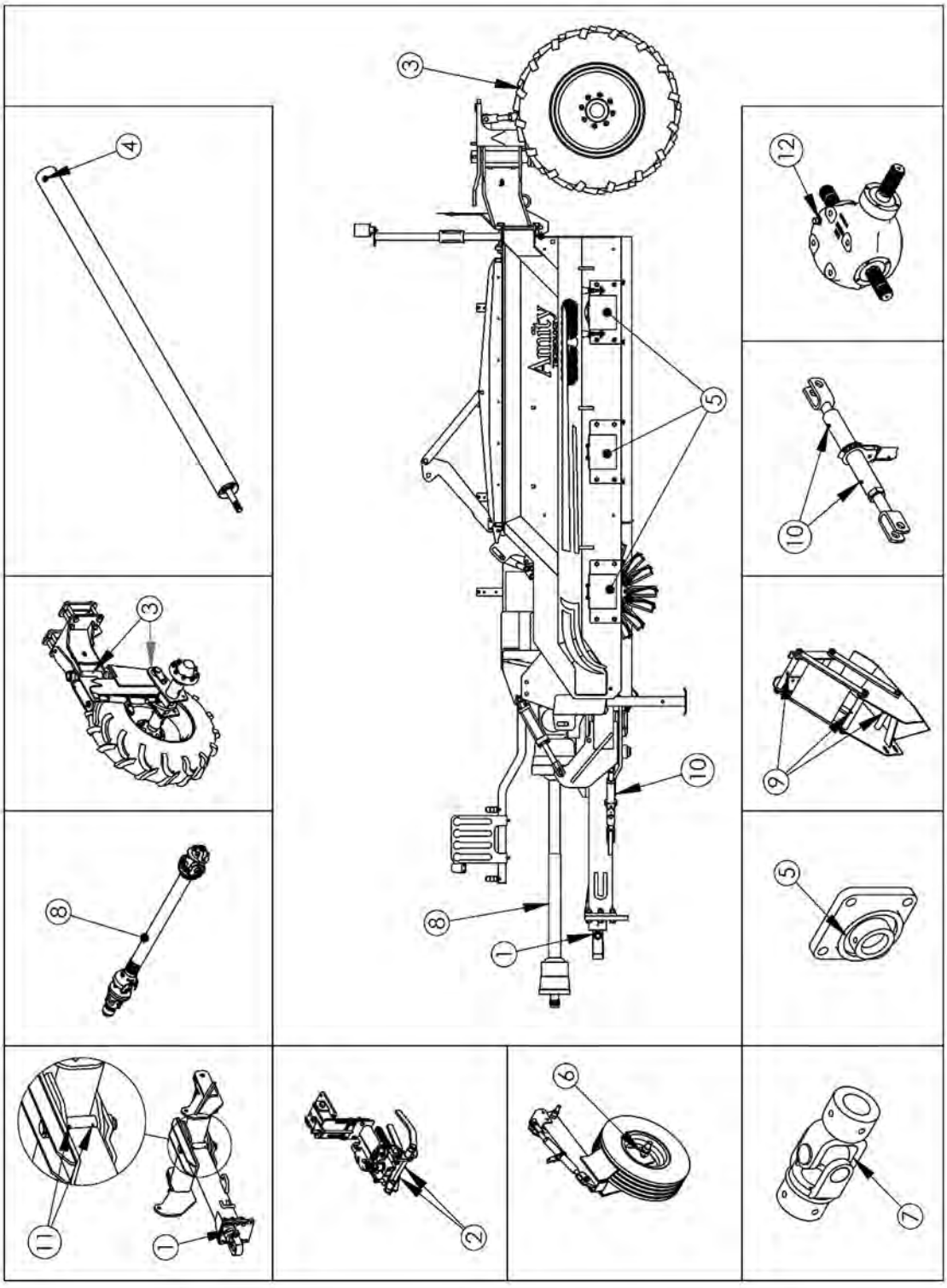
1. Grease front hitch pivot, row finder and lift, steerable struts, drive couplers, hanger bearings.
2. Inspect all drums for missing or damaged flails.
3. Check Scalper knives and sharpen if needed.

50 Hours:

1. Check oil level in gearboxes. Fill to proper level if low. Check more often if leaks are noticed.
2. Grease all U joints and driveshaft, scalper pivot points, front hitch rear pivot, ratchet jacks and stabilizer wheels.

250 Hours or Annually:

1. Clean defoliator and inspect all wear components.
2. Change oil in gearboxes 80W90 EP (ISO VG 150 EP).
3. Clean gearbox breathers.
4. Purge rear wheel bearings.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12.9 Lubrication Chart

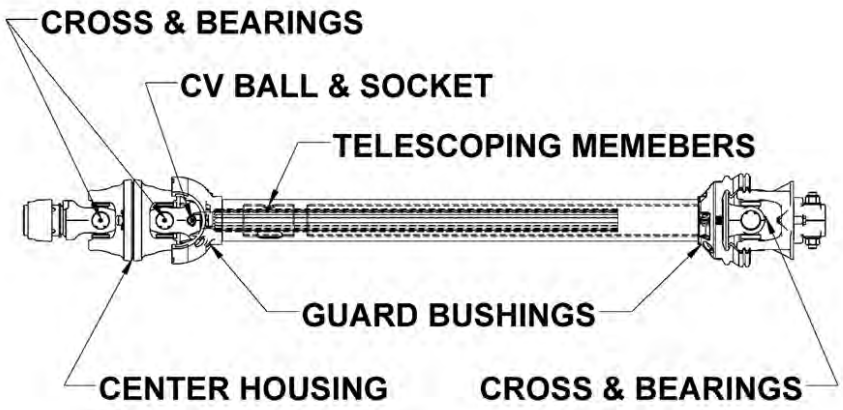
Ref #	Description	Lubrication Type	Frequency	Quantity	Number of Instances
1	Front Hitch Pivot	Multi-Purpose Grease	12 Hours	3-5 pumps	1
2	Rowfinder & RF Lift	Multi-Purpose Grease	12 Hours	1-2 pumps	3 to 5
3	Rear Struts	Multi-Purpose Grease	12 Hours	2-3 pumps	2 to 4
4	Drive Couplers	Moly EP Grease NLGI #2	12 Hours	6-8 pumps*	3 to 6
5	Sealed Ball Bearings	Multi-Purpose Grease	12 Hours	1-2 pumps	3 to 6
6	Stabilizer Wheels	Multi-Purpose Grease	50 Hours	2-3 pumps	2 to 4
7	U-Joint	Multi-Purpose Grease	50 Hours	3-5 pumps	8
8	Driveshaft	Multi-Purpose Grease	50 Hours	See Guide	3 to 5
9	Scalper Pivot Points	Multi-Purpose Grease	50 Hours	3-5 pumps	24 to 48
10	Ratchet Jacks	Multi-Purpose Grease	50 Hours	1-2 pumps	1 to 5
11	Rear Hitch Pivot	Multi-Purpose Grease	50 Hours	1-2 pumps	2
12	Gearbox	EP 80W90 (ISO VG 150 EP)	250 Hours/ Annually	See Guide	5
13	Rear Wheel Hubs	Multi-Purpose EP Grease	250 Hours/ Annually	Purge Hub	4 to 8

* Cannot be overgreased.

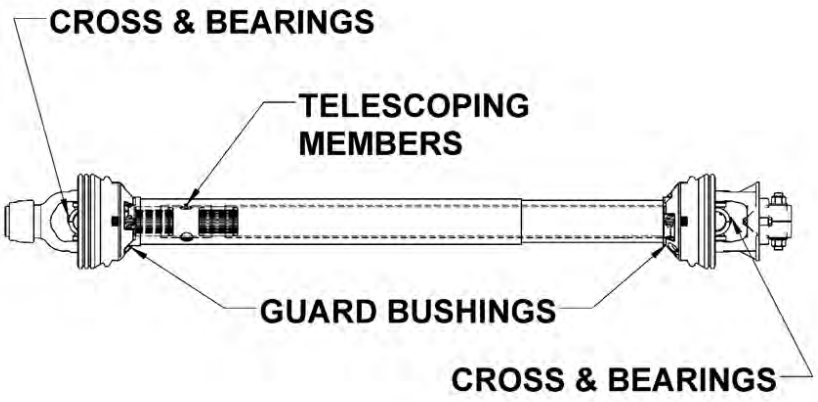
12.10 PTO Driveline Servicing

The first lubrication interval should be 16 to 24 hours of operation after initial start-up. Then follow the schedule outlined in Table 12-2.

NOTE: Lubricate all fittings with a good quality lithium soap compatible E.P. grease meeting the NLGI #2 specifications and containing no more than 1% molybdenum disulfide



NOTE: CV joint needs to be angled after greasing to properly distribute grease.



NOTE: Replacement parts are not lubricated. They must be lubricated at the time of assembly. Use amounts listed above per location. Then, follow the above recommendations.

Table 12-2: PTO Driveline Servicing

Description	Frequency	Quantity
Cross and Bearings	50 hours	5 pumps
Telescoping Members	50 hours	8-10 pumps
CV Ball and Socket	50 hours	5 pumps
CV Center Housing	50 hours	30 pumps
Non Rotating Guard Bushings (1000 RPM Max.)	50 hours	5 pumps

12.10.1 Shear Bolt Service

The PTO shaft requires a 7/16” x 2-1/4” Grade 5 shear bolt and lock nut. Spare shear bolts are supplied with all new defoliators and can be found secured to the hydraulic hose holder above the hitch.

The orientation of the shear bolt in the coupler of the PTO shaft is important. Install all shear bolts as shown below in Figures 12-6 and 12-7.

NOTE: PTO shaft must be unhooked from the tractor to install shear bolts.

Figure 12-6: Shear Bolt Orientation—Lock Nut

Figure 12-7: Shear Bolt Orientation—Bolt Head

See sections 13.0 and 14.6 for additional information on replacing shear bolts.

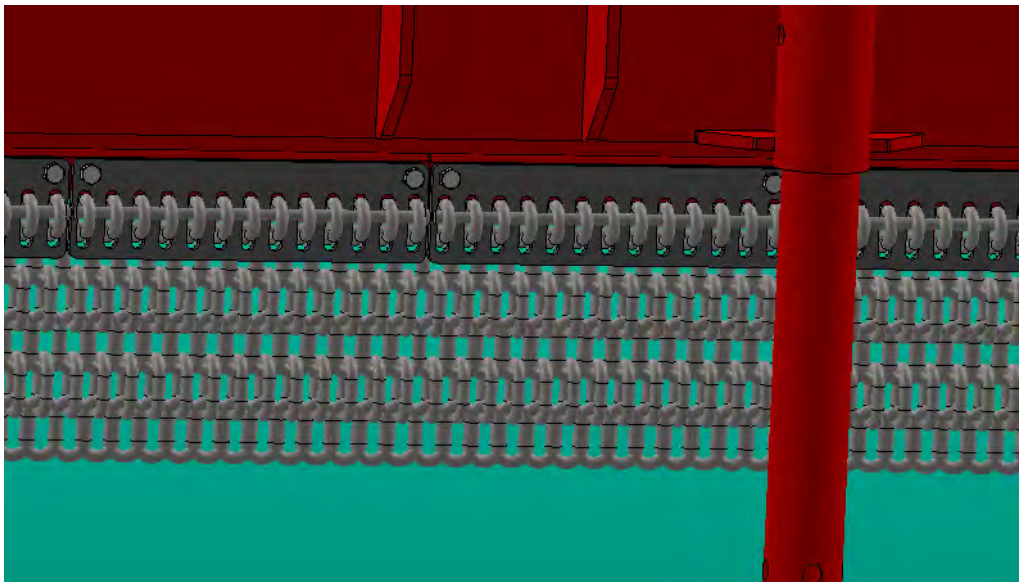
12.11 Hanging Chain Guard:

Hanging chain guards are a safety guard against rocks and/or debris being kicking up by the operation of flails and flung out towards the front of the machine. Over time, these chains or related components will wear and be in need of replacement.

Chain replacement:

1. Ensure machine is stopped, stands are deployed, and the unit in a secure position.
2. Inspect all chain, rods, and plates to determine which ones need to be replaced.
3. Remove bolts holding chain sub-section in need of repair.
4. Remove chain holder rod by removing rod cap and sliding the rod out from the chain loops.
5. Replace broken, cracked, or stretched chain/rods using only genuine Amity parts. Refer to the parts manual for the appropriate part numbers.
6. Reinstall chain sub-section by inserting rod back through chain loops and installing rod cap.
7. Tighten bolts holding the chain to its mount underneath the front of the frame.

WARNING: Operating a defoliator with loose or worn chain could cause injury or damage to a bystander, the tractor, or the machine itself.



13.0 TROUBLESHOOTING

PROBLEM	*CAUSE*	*SOLUTION*
Beet tops not clean	Defoliator height not properly set	Verify defoliator height is correctly set; see section 7.0. This should be done every time a field, variety, or conditions change.
	Traveling too quickly	Reduce travel speed until beets are satisfactorily clean.
	Worn/broken flails	Replace flails.
Engine RPM not fast enough	RPM is too slow	Increase RPM
Beet tops damaged	Defoliator height not properly set	Verify defoliator height is correctly set; see section 7.0. This should be done every time a field, variety, or conditions change.
	Traveling too slowly	Increase travel speed until damage is reduced and beet tops are still clean.
	Flail style	In some conditions studded flails may cause beet damage over other styles. This is a tradeoff for increased performance in tough conditions, it is up to the grower to decide what is wanted for their operation.
Knocking beets out of the ground.	Defoliator height and travel speed not properly set	Set defoliator height per section 7.0. Increase travel speed if greens are all removed.
	Beets not firmly rooted	Set defoliator as high as possible while still defoliating well without reducing speed.
Machine roll (yaw) from side to side	Stabilizer struts not properly set	Lower stabilizer struts so they lightly, but constantly, contact the ground when hitch is lowered to stops.
	Traveling too fast for field conditions	Decrease travel speed
	Rear Struts too far inboard	Move rear struts outwards on frame to increase stability if location works with prior planter/sprayer tracks.

PROBLEM	***CAUSE***	***SOLUTION***
Scalper does not properly top beets	Knives dull	Sharpen knives or replace if worn.
	Knife not properly set	Adjust knife height and cut angle to have the correct depth and cut flat.
	Basket not properly set	Adjust scalper bar height so basket has proper travel range for defoliator height.
	Excessive petiole left before scalpers	Excessive petiole can hold the scalper up away from the beet resulting in inconsistent and poor scalper performance. Reset defoliator height or reduce travel speed, depending on cause.
Row Finder not working	Hydraulics not properly set-up	Ensure correct hoses are hooked up for both the constant and override functions. Also, check that the tractor hydraulic setting for the row finder constant function are on continuous and do not time out.
	Hydraulic flow rates not properly set	Set row finder constant rate to approx. 7 GPM continuous flow, row finder override to 10 GPM with a cycle time of 3-4 seconds.
	Row finder height not properly adjusted	Refer to section 7.0 and set row finder height per instructions.
	Operating on side hills	r/w: Adjust flow
	Row finder plumbing or fittings or orifices not installed correctly or clogged	Ensure 8MB-8MJ 0.063” orifice is in correct location. Check for debris under orifices in steering block

PROBLEM	***CAUSE***	***SOLUTION***
Row finder leaking	Fittings loose Spool seals worn	Tighten any loose fittings. Rebuild or replace row finder valve.
Rear lift cylinders leaking down	External oil leak Strut lift tied to row finder circuit	Find the source of the leak and repair or replace leaking equipment. Strut lift cylinders connected to the row finder circuit will leak down if the row finder valve has an oil leak; either separate the strut lift from the row finder circuit or rebuild/replace the row finder valve.
Defoliator not running level left/right	Running in planter/ sprayer tracks Low/uneven tire pressure Weight not balanced side-to-side Defoliator not level	Evaluate if it is possible to move rear struts in or out on the defoliator frame so they are not operating in wheel tracks. Check to make sure all tire pressures are set according to section 3.0. Add wight to the corner of the defoliator on the weight mount. Reset defoliator level per section 7.0.
Machine vibrates	Unbalanced drums Damaged or worn drive shaft	Check for missing flails on both steel and rubber drums. Replace missing or broken rubber flails. For steel flails, replace damaged or missing components; for any flails being replaced also replace the same components on the other side of the drum to maintain balance. If the vibration continues, remove steel drum(s) and have them balanced. Inspect all drive shaft and U-joints for worn or damaged components; repair or replace as necessary.

PROBLEM	***CAUSE***	***SOLUTION***
Breaking shear bolts	Front drum contacts ground	Ensure hitch cylinder stops are correctly set and/or slow down and lift front while traveling in deep ditches or ruts.
	Engaging too quickly	For tractors equipped with an automatic PTO clutch, set to lowest engagement setting.
	Shear pin too small	After checking the entire drivetrain and determining that there are not issues, the shear bolt may be upgraded to a 7/16" GR 8 bolt to replace the 7/16" GR 5 that is standard (3750 only).
	PTO shaft lubrication	Grease PTO
Mud build-up under top doors	Operating conditions	Tough conditions will require additional cleaning.
Poor defoliation from low RPM	Not running drums at designed RPM speed	Set tractor to full RPM

14.0 Appendices

14.1 Conversions

1 acre = 0.404 hectares	1 mph = 1.609 kph
1 acre = 43,560 square feet	1 mile = 1.609 km
1 inch = 2.54 cm	1 psi = 6.895 kPa
1 foot = 0.3048 m	1 GPM = 3.785 LPM
1 lb = 0.45359 kg	1 hp = 0.746 kw
1 lb = 16 oz	1 ft-lb = 1.356 N·m

14.2 Trantorque Installation Procedures

Shaft and bore diameters along with surface finishes are critical for the proper installation of a Trantorque bushing. These specifications are held at the factory during manufacturing. If it is necessary to disassemble and reassemble a Trantorque application that is undamaged and intact the following procedures will insure a positive installation. If it is necessary to replace a unit in which the Trantorque or shaft may have come loose, rotated or been damaged, a thorough inspection of the components is necessary to insure the failure will not reoccur.

CAUTION: Do not use lubricants in this installation. The use of any lubricant on the contact surfaces may result in bushing failure and will void all warranties

1. Both the shaft and component bore must be completely free of paint, grease, oil, dirt, and burrs. Clean the surfaces with a non-petroleum based solvent such as isopropyl alcohol, using rag (not spray). Do not clean/remove oils from the trantorque part itself.
2. Insert the Trantorque into the bore making sure the mating hub is flush against the shoulder at the hex flats.
3. Insert the shaft fully and hand-tighten the nut until the assembly becomes snug on the shaft.

IMPORTANT: The shaft must fully engage the gripping area of the Trantorque.

4. Using a torque wrench, tighten the nut to the proper torque shown in Table 13-1.

IMPORTANT: A torque wrench must be used! An impact wrench will not yield the proper torque and the installation will fail. Minimal under-tightening will allow the Trantorque or shaft to spin in the bore. Over-tightening will damage or crack the Trantorque. Do not use an impact wrench during installation.

Table 14-1: Trantorque Installation Torque

Part #	Description	Torque
58459	Hub-Trantorque 1.75 in.	270 ft-lb (366 N·m)
59259	Hub-Trantorque 2.25 in.	510 ft-lb, (691 N·m)

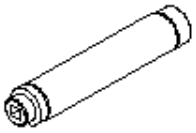
14.3 Tools

Amity has the following tools available:

Trantorque sockets
(#59107, #59108, #64820)

Trantorque wrench (#64320)

#64320



#59107 (1 ¾ in., 4.45 cm)
#59108 (2 in., 5.08 cm)
#64820 (2 ¼ in., 5.7 cm)

14.4 PTO Driveshaft Friction Clutch Setting

To set the friction clutch to the correct setting after rebuilding simple torque the clutch plate down evenly in a star pattern until the spacer collar is just able to move, but not loose. The collar holds a set distance which sets the clutch level. There are no torque spec for the bolts.

14.5 Easy Lock Assembly and Removal

Removal:

1. Remove the EASY LOCK® tab with a screwdriver Figure 13-2.
2. If the guard is chained, remove or hold back the chain to prevent it from blocking the bearing.
3. Turn the bearing in the direction as indicated in Figure 13-3. Then, slide guard off the bearing.

Assembly:

1. Align the bearing tabs with the guard bell slots.
2. Slide the bell onto the bearing.
3. Turn the bearing to lock it in place.
4. Snap the EASY LOCK tab into the bell.

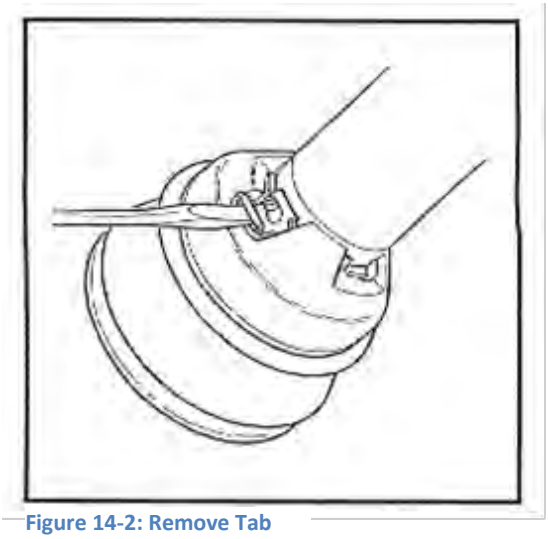


Figure 14-2: Remove Tab

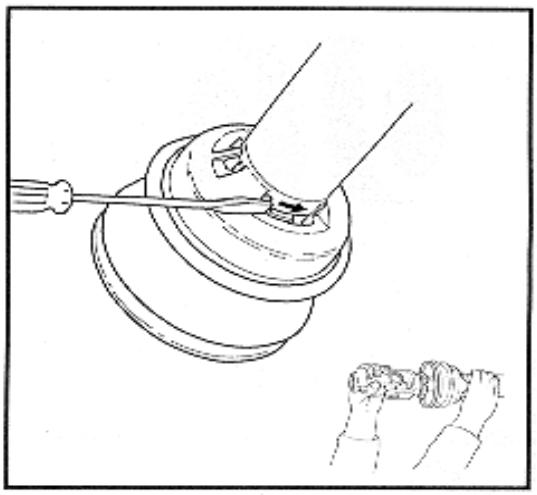


Figure 14-3: Turn Bearing

14.6 Torque Chart

Table 7-1: Bolt Torque Chart

Torque values listed are for coarse thread bolts, in general use only. Do not use these values if a different torque value or tightening procedure is listed for a specific application. Check the tightness of cap screws periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with the identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, they should only be tightened to the strength of the original fastener.

Make sure fastener threads are clean and dry, and thread engagement is properly started. This will prevent them from failing when tightened.

Tighten cap screws with a plastic insert or crimped steel-type lock nuts to approximately 50% of the torque shown in Table 8. Tighten toothed or serrated-type lock nuts to the full torque value.

Size (A)		Grade 5		Grade 8	
Standard	Metric	N*m	lb-ft	N*m	lb-ft
1/4"	.635 cm	12	9	17	12.5
5/16"	.794 cm	25	18	35	26
3/8"	.953 cm	44	33	63	46
7/16"	1.11 cm	70	52	100	75
1/2"	1.27 cm	110	80	150	115
9/16"	1.43 cm	155	115	225	160
5/8"	1.59 cm	215	160	300	225
3/4"	1.91 cm	375	280	550	400
7/8"	2.22 cm	625	450	875	650
1"	2.54 cm	925	675	1300	975
1 1/8"	2.86 cm	1150	850	1850	1350
1 1/4"	3.18 cm	1650	1200	2600	1950
1 3/8"	3.49 cm	2150	1550	3400	2550
1 1/2"	3.81 cm	2850	2100	4550	3350

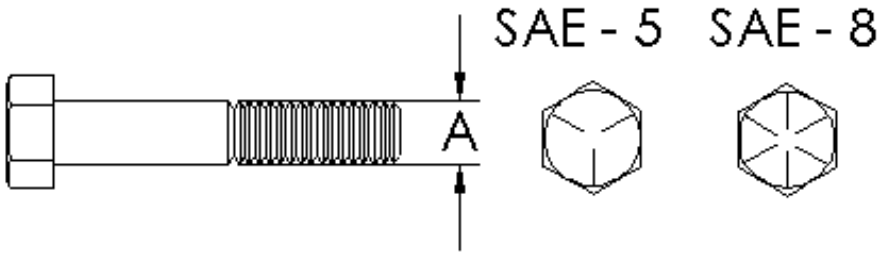


Figure 7-19: Bolt Grade Identification

14.7 Flail Tube to Gearbox Assembly and Removal

Flail tubes include a rubber spacer to properly align gear depth when using the drive coupler. This rubber spacer ensures the flail tube is aligned properly on the mating gears of the gearbox shaft, drive coupler, and drive sleeve.

During assembly, make sure all parts are included as shown in the Parts Manual, and then slide the drive coupler to all the way back to press on the rubber spacer. This centers the mating gears as shown below so they engage properly. Only one snap ring will be needed on the gearbox shaft towards the side nearest the gearbox body as illustrated in the Parts Manual. This should also assist in ease of disassembly of the flail tube from the gearbox shaft.

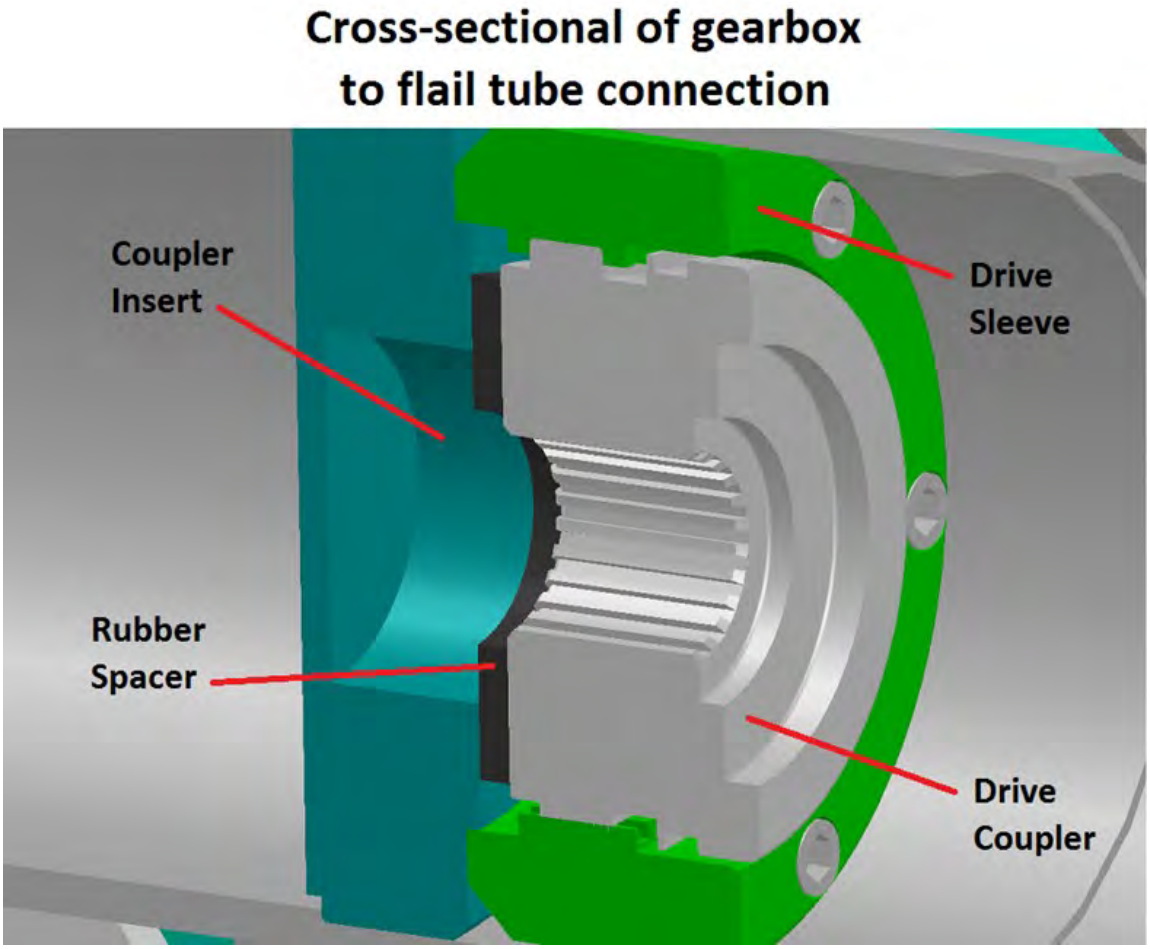


Figure 14-4: Cross-section of flail tube to gearbox assembly

No.	Date	Description	Related No.	Page
183	4/26/06	2125 & 2155 w/Overrunning Clutch R&R		1 of 9

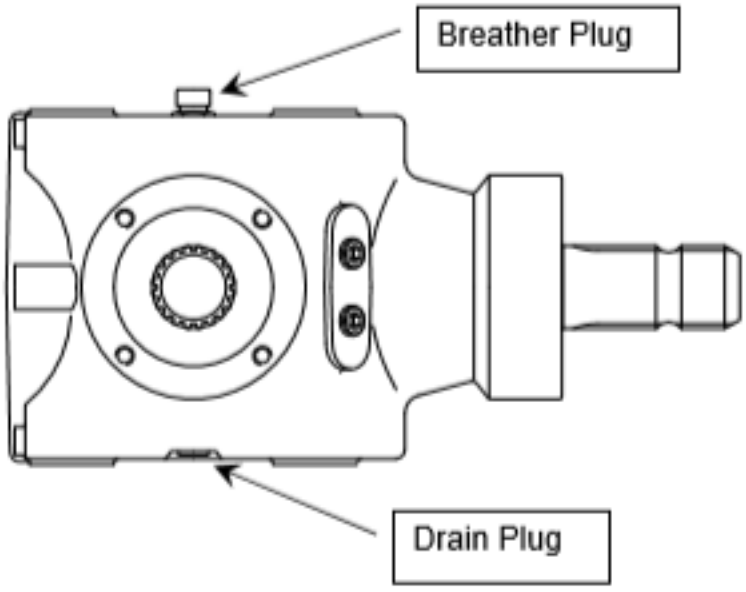
Description: This is a description of the steps required to completely disassemble and reassemble gearbox code S2100100033, which is a three-way S2100 with overrunning clutch on the Z-axis. Other S2000 gearboxes, with or without overrunning clutches, will use a similar procedure.

Tools required:

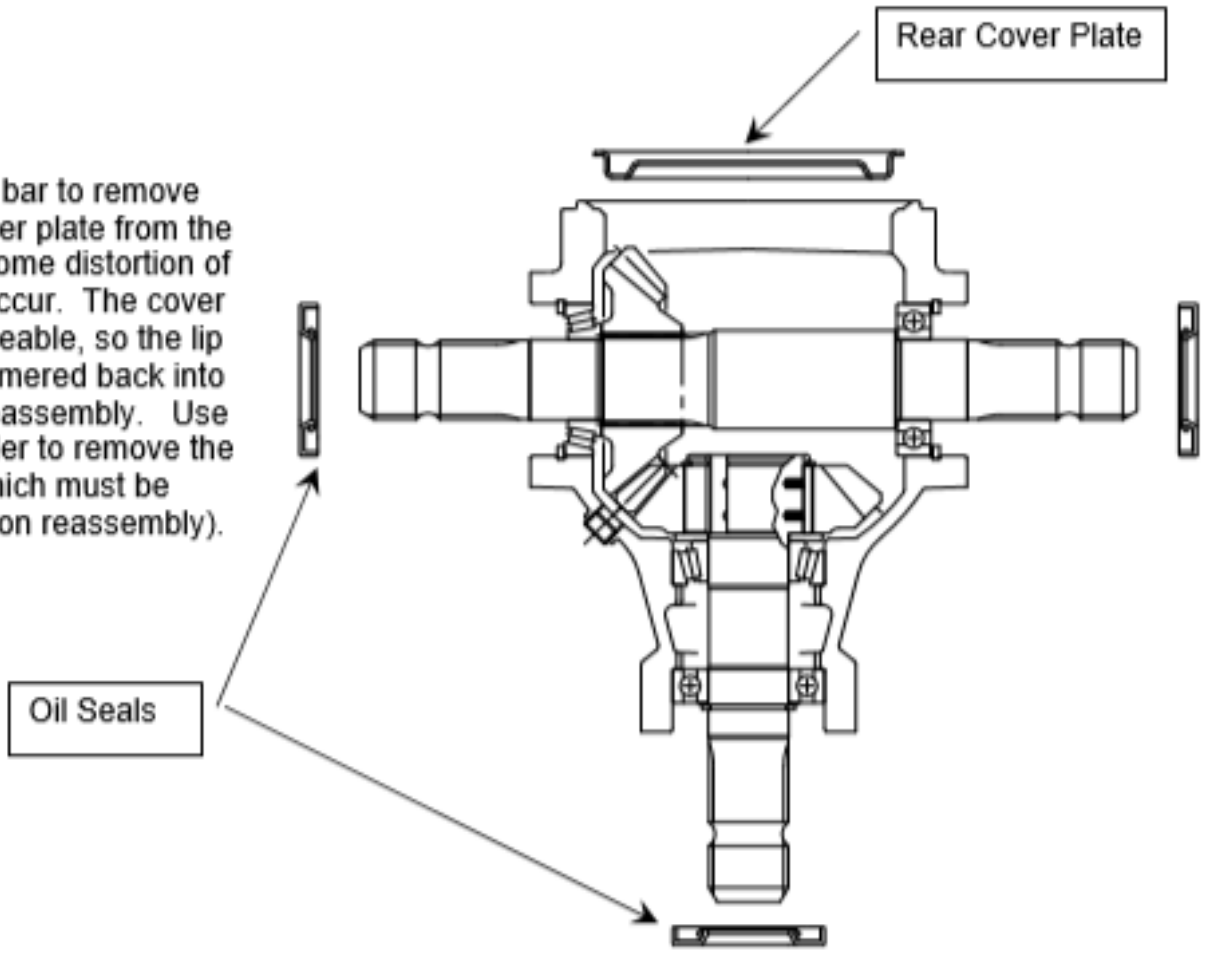
Drain pan
Pry bar
Seal puller
Snap ring pliers (straight, internal and external or convertible)
Ball peen hammer
Soft face hammer (bronze, copper, brass or similar)
Steel tubes (to fit loosely inside bores of casting and/or outside shafts – see diagrams)
Small punch (Ø8 or Ø10 mm)
Gear oil (SAE 90 EP recommended)
A press can be used for several steps of the disassembly / assembly process, but is not absolutely required.

Disassembly

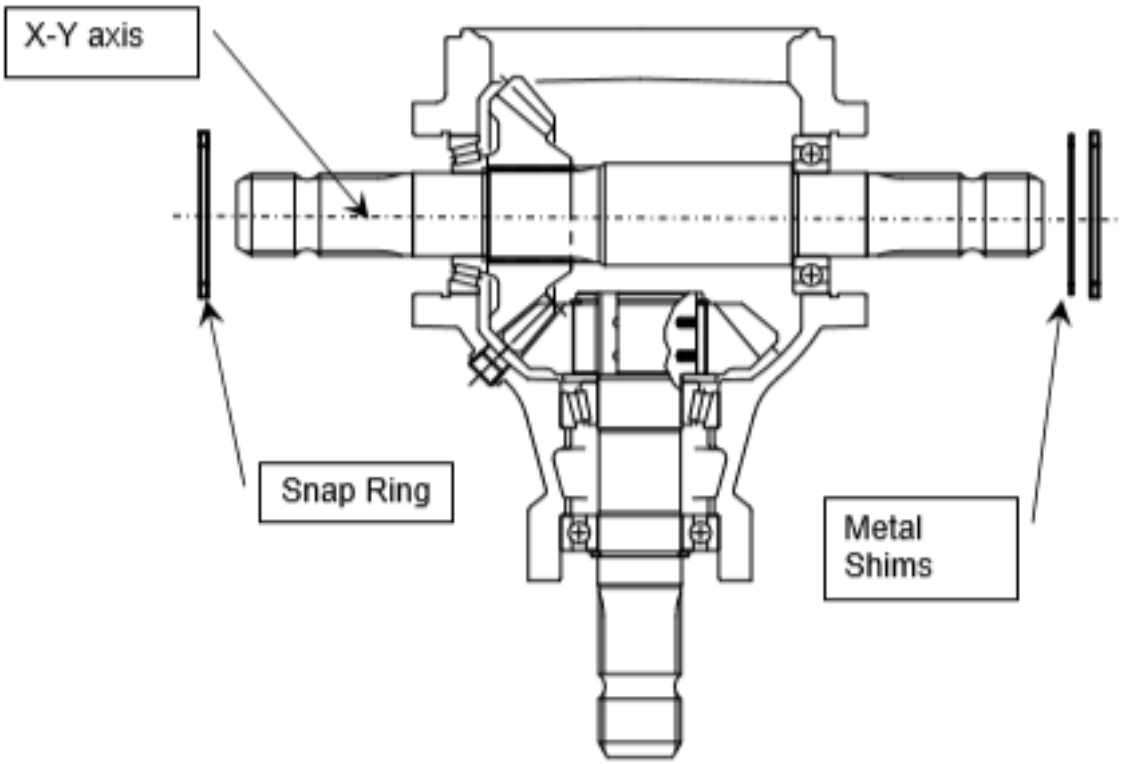
Position the drain pan under the drain plug. Remove the drain plug and let the oil flow into the pan (remove the breather plug to release vacuum and speed flow of oil). Dispose of used gear oil according to local regulations.



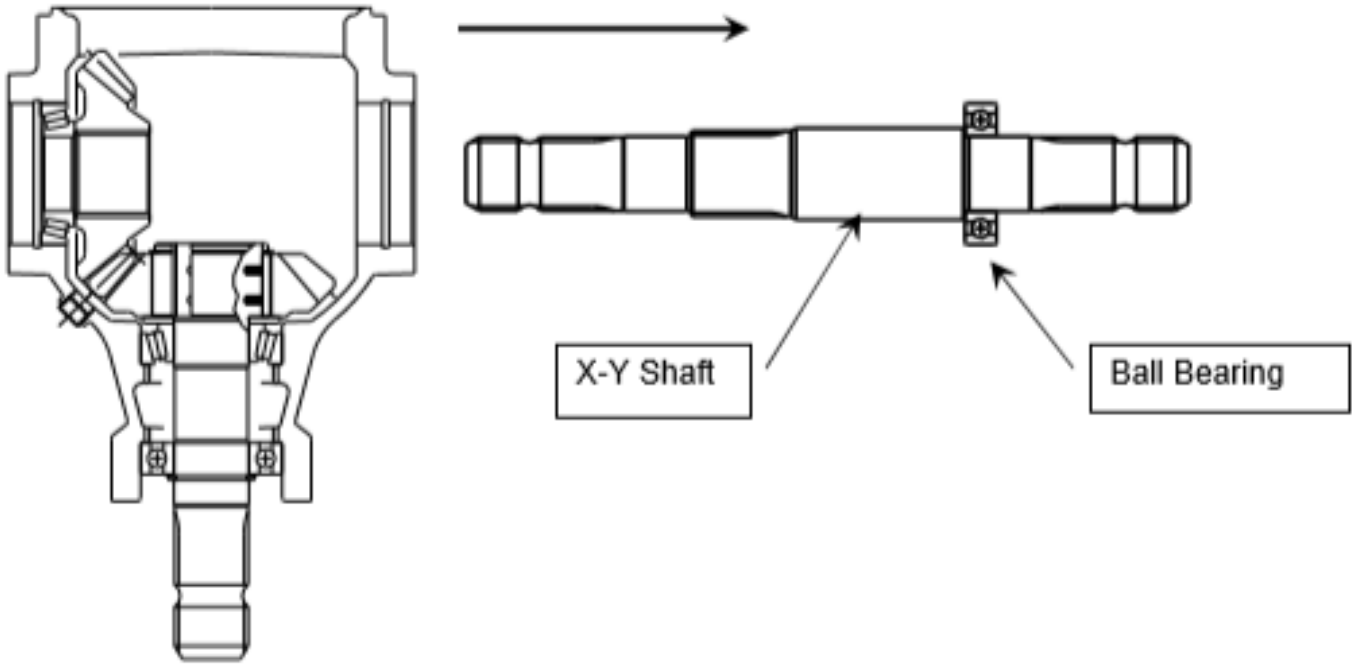
Use the pry bar to remove the rear cover plate from the gearbox. Some distortion of the lip will occur. The cover plate is malleable, so the lip can be hammered back into shape for reassembly. Use the seal puller to remove the oil seals (which must be replaced upon reassembly).



Remove the snap rings from the casting on the X-Y axis. Behind one of the snap rings, you should find one or more thin metal shims – remove these as well.



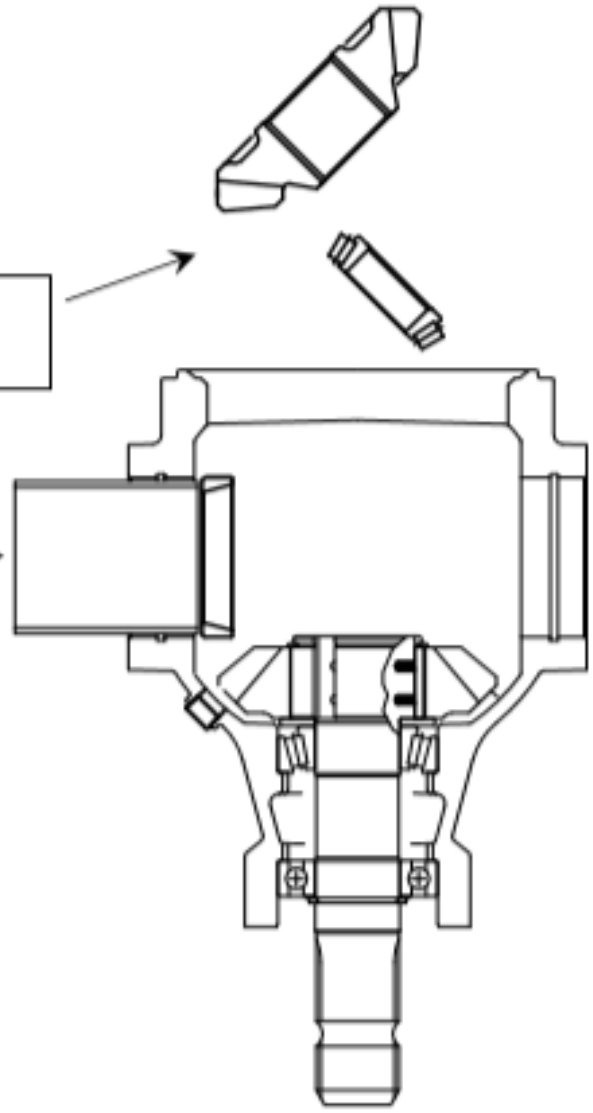
Press (or use soft face hammer if a press is unavailable) the X-Y shaft out of the gearbox, in the direction shown. This will also remove the ball bearing from the gearbox casting.



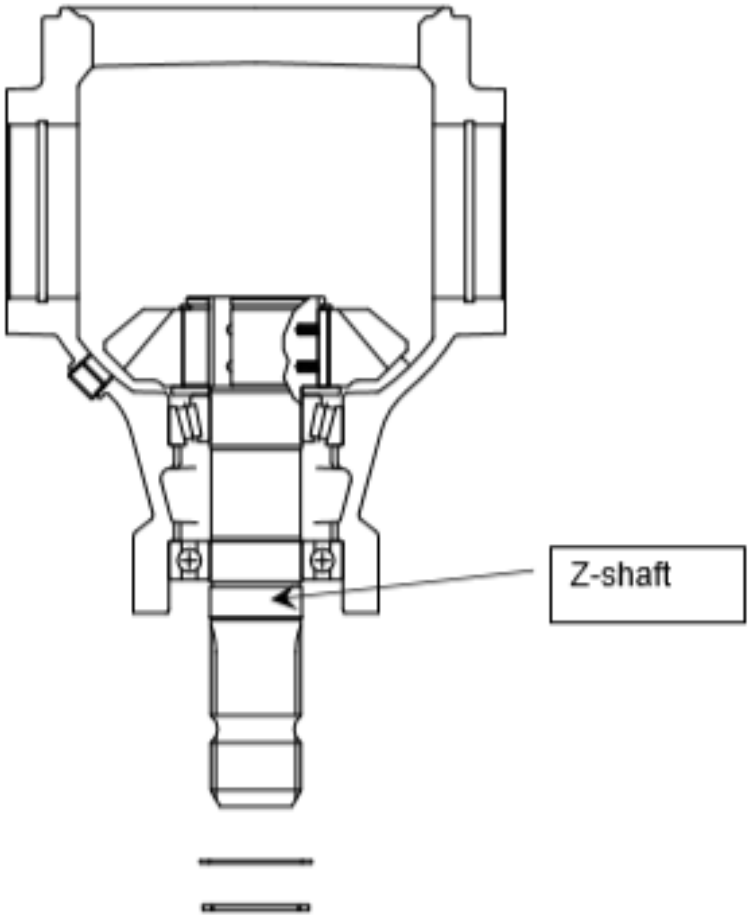
The ball bearing may be removed from the X-Y shaft in several different ways. Note that pressure applied to the outer race may damage the balls and raceways. The following methods are suggested:

a) A metal tube that fits over the shaft and contacts the inner raceway may be used to press the bearing off the shaft.
b) Hammer the end of the shaft against a soft surface (i.e. wood). The inertia will often dislodge the bearing from its seat.
c) A bearing separator may be inserted under the bearing, and a 2-jaw puller used to press the separator and bearing from its seat.
d) Deep groove ball bearing pullers designed for this specific task (if available).

Remove the gear and inner race of the taper roller bearing. Press the outer race out of the casting, using a short piece of metal tube that fits loosely inside the bore.



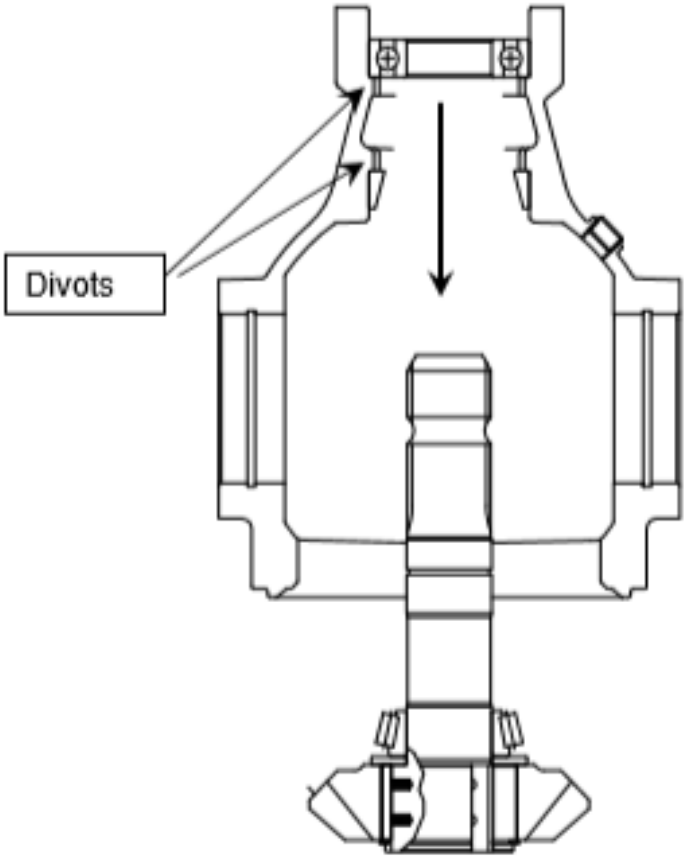
Remove the snap ring from the Z-shaft.



Press (or use soft face hammer if press is unavailable) the Z-shaft out of the back of the gearbox.

There are a couple of divots on either side of the casting. Use a punch to drive out the ball bearing and outer race of the taper roller bearing via these divots.

Clean any old oil, debris, or metal filings out of the inside of the casting.



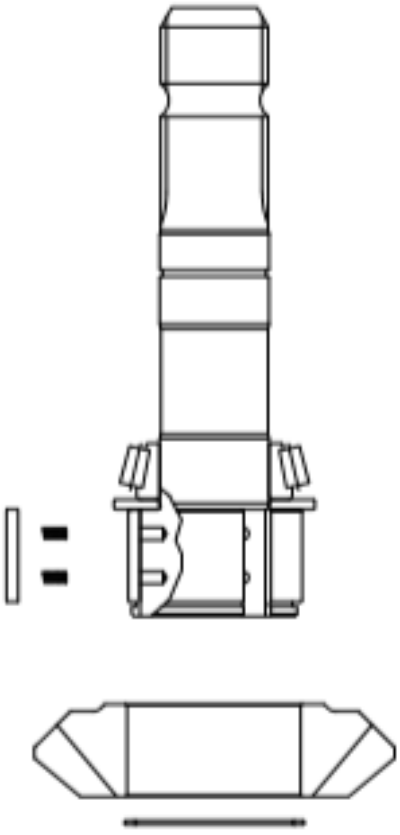
Remove the snap ring from the end of the Z shaft.

Slide the gear off the shaft.

Remove the three (3) pawls from the overrunning clutch mechanism. Remove the six (6) small springs located under the pawls (two per pawl).

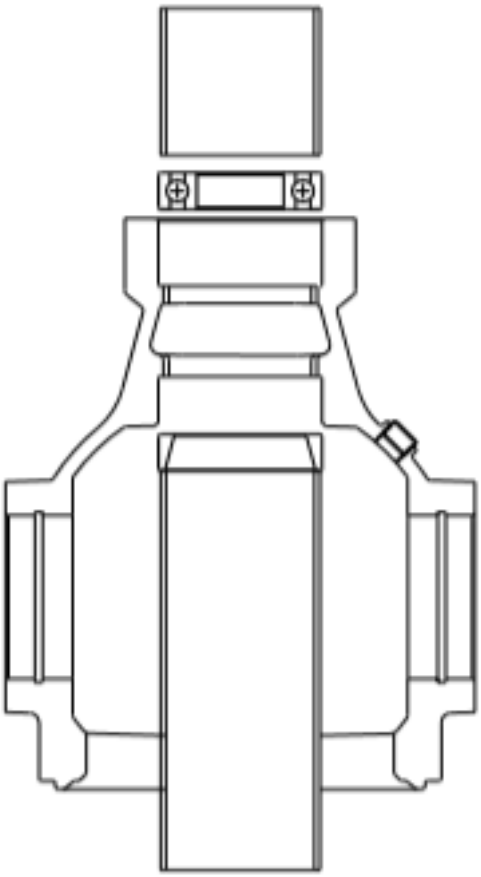
Remove the spacer (if included), and remove the inner race and rollers as described before for the X-Y shaft.

This completes the disassembly process. Thoroughly clean all components, and inspect for wear or damage. Replace any excessively worn or damaged components with genuine OEM components.



Assembly

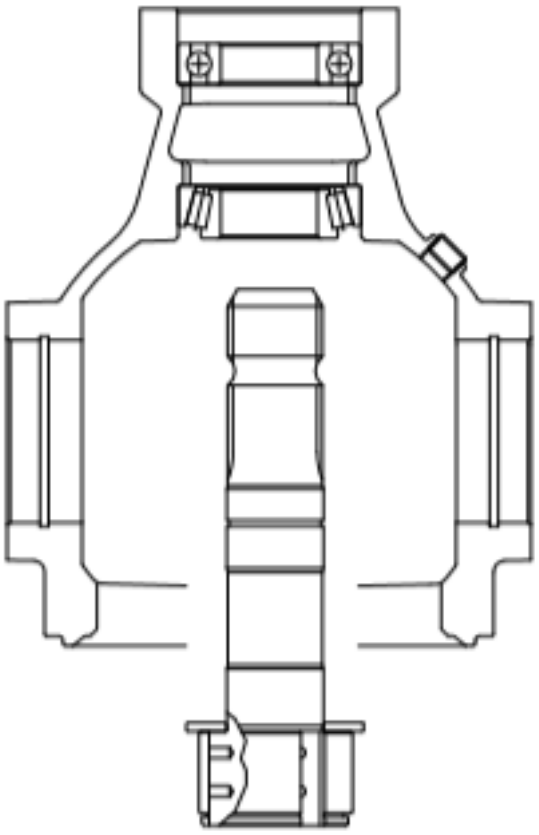
Press the ball bearing into place, using a piece of tube that contacts the outer race only (pressure on the inner race may damage the bearing). Press the outer outer race of the taper roller bearing through the back side of the casting. Note the orientation of the race.



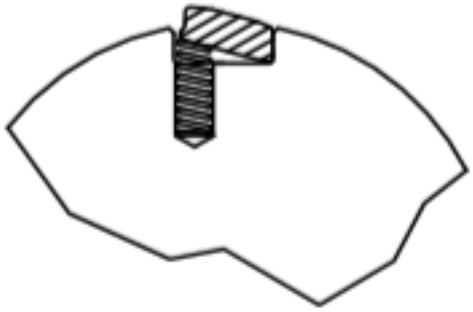
Place the inner race and rollers of the taper roller bearing in position. Slide the spacer onto the Z-shaft (if equipped), and press the shaft into place.

Adjust the preload on the bearings by adding or deducting shims under the Z-shaft snap ring. Proper adjustment is achieved when there is zero "play" in the shaft (i.e. no movement in or out), but the bearings rotate freely.

Make sure the snap ring is fully seated in its groove on the Z-shaft.

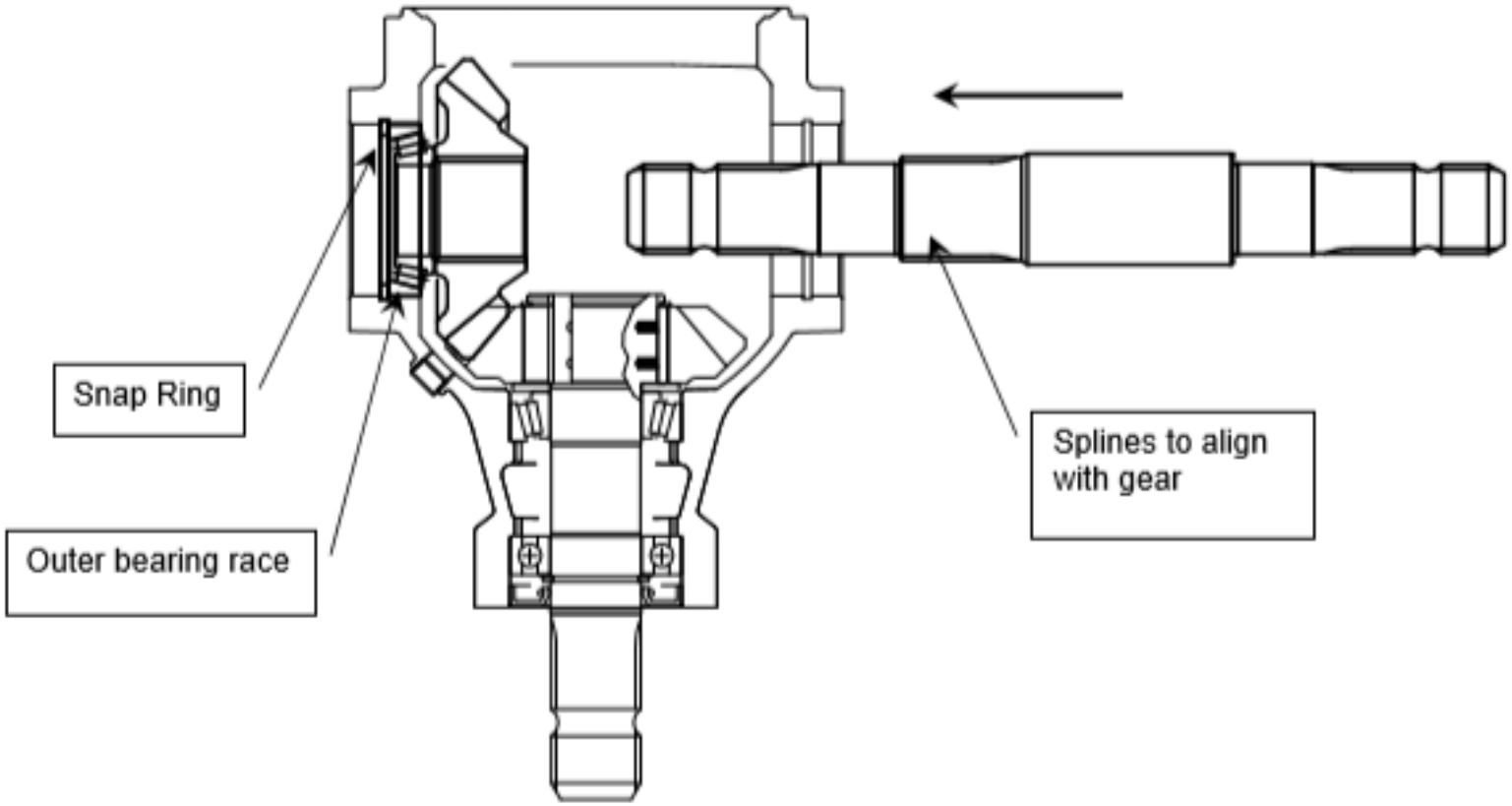


Insert one spring into each hole in the Z-shaft. Place the three (3) pawls into the grooves in the Z-shaft, with the shaped edge oriented as shown:

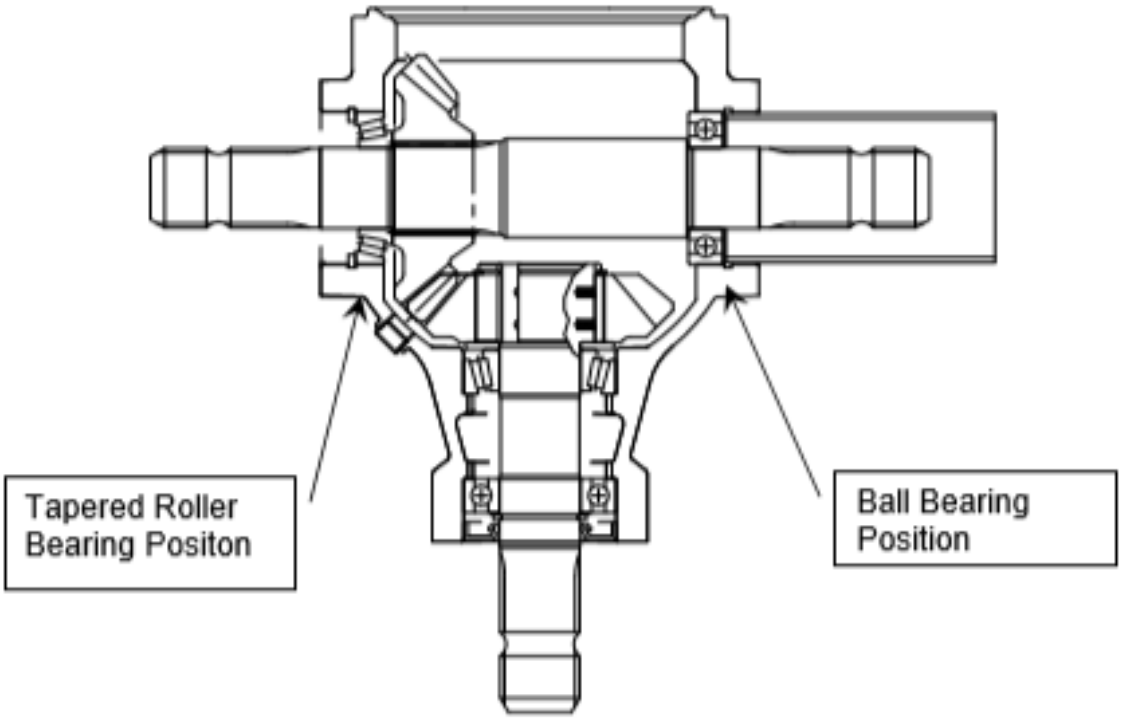


While holding the three pawls compressed on top of their springs, slide the pinion gear over the top of the shaft in position. Rotate forward and backward to check the function of the overrunning mechanism. Install snap ring.

Install the snap ring in the position shown below. Press the outer race of the tapered roller bearing into place until it seats against this snap ring (note orientation). Put the inner race and rollers in the proper position, and then position the gear on top of this bearing. Align the splines of the X-Y shaft with those in the gear, then press the X-Y shaft into place.



Press the ball bearing into position on the opposite side of the shaft.



Adjusting Preload and Backlash

Add shims between the ball bearing and snap ring until their is no freeplay in the shaft (i.e. movement in or out), but the bearings rotate smoothly. This sets the proper preload on the bearings.

The backlash (clearance between gear teeth) must be adjusted to proper levels.

S2100 series, 1:1, 1.57:1, and 1:1.57 ratios – backlash 0.20 – 0.25 mm (0.008 – 0.010 in)
S2125 series, 1:1.35, 1.35:1, and 1:1.93 ratios – backlash 0.20 – 0.25 mm (0.008 – 0.010 in)

The backlash can be measured with a dial indicator positioned on the pitch diameter of the gear (approximate center of contact patch), and measuring the free rotation of the crown gear (X-Y axis) as the pinion gear is held stationary (Z-axis).

To reduce backlash, take one of the shims from under the ball bearing position (above), and insert between the snap ring and bearing on the tapered roller bearing position. To increase backlash, reposition shims from the taper roller side to the ball bearing side.

When adjusted properly, the shafts should rotate smoothly without binding, and a slight "click-clack" sound can be heard when one of the shafts is rotated one way and then the other. Operation without sufficient backlash will lead to excessive noise, rapid heat generation, and premature failure of the gearbox.

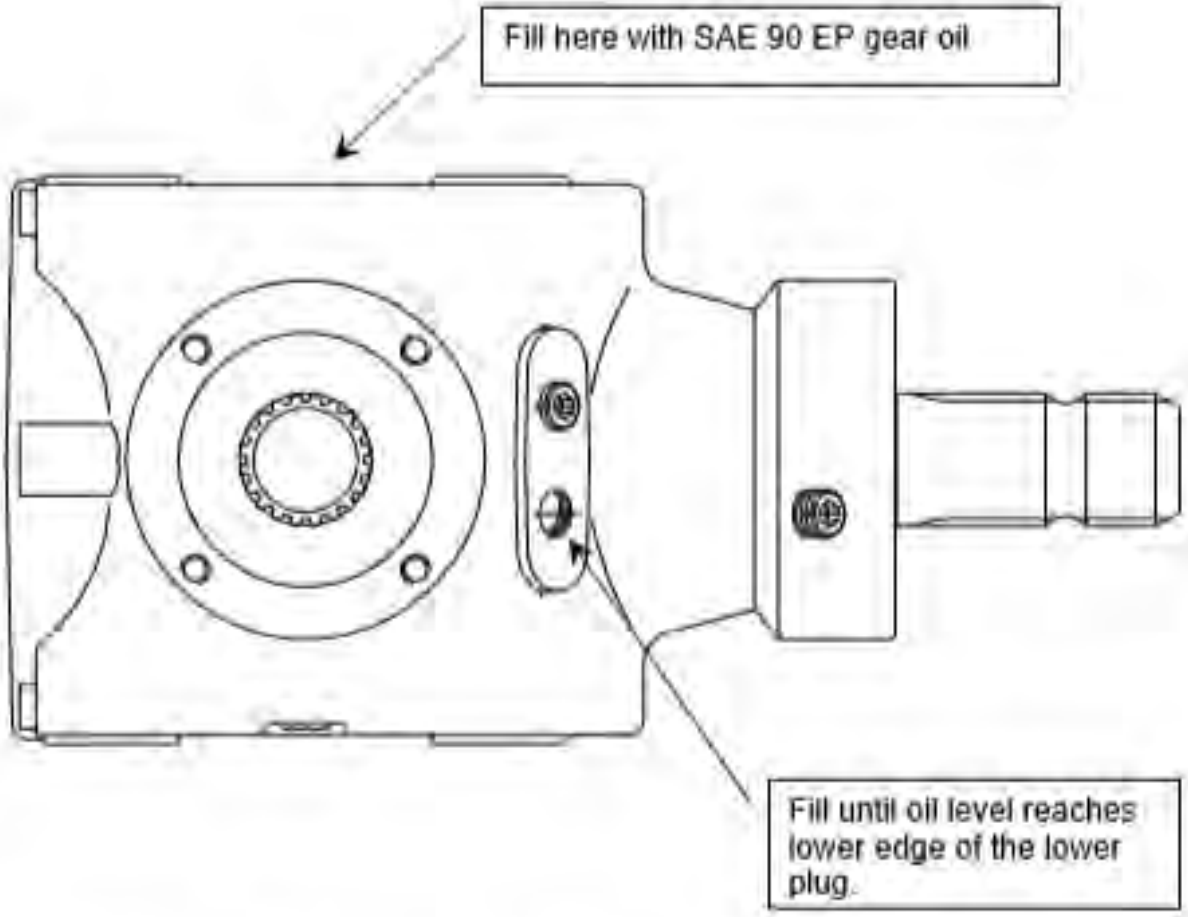
Completing Assembly

Check that all snap rings are fully engaged in their grooves.

Clean the shafts and bores of the casting of any debris. Coat the inside lip of the oil seals with gear oil. Press the oil seals into their bores, paying attention to not damage the sealing lip while it passes over the shaft.

Hammer the back plate into the housing.

Wrap the drain plug threads with Teflon® tape or pipe dope and reinstall into the gearbox. Set the gearbox on a level surface, and remove the LOWER drain plug. Fill with good quality SAE 90 EP gear oil until it reaches the level of the lower plug hole. Wrap the level plug and breather plug threads with Teflon® tape or pipe dope and reinstall.



Check the operation of the gearbox on initial startup. Drain and refill with fresh lubricant after the first 50 hours of use, and every 500 hours of use thereafter.